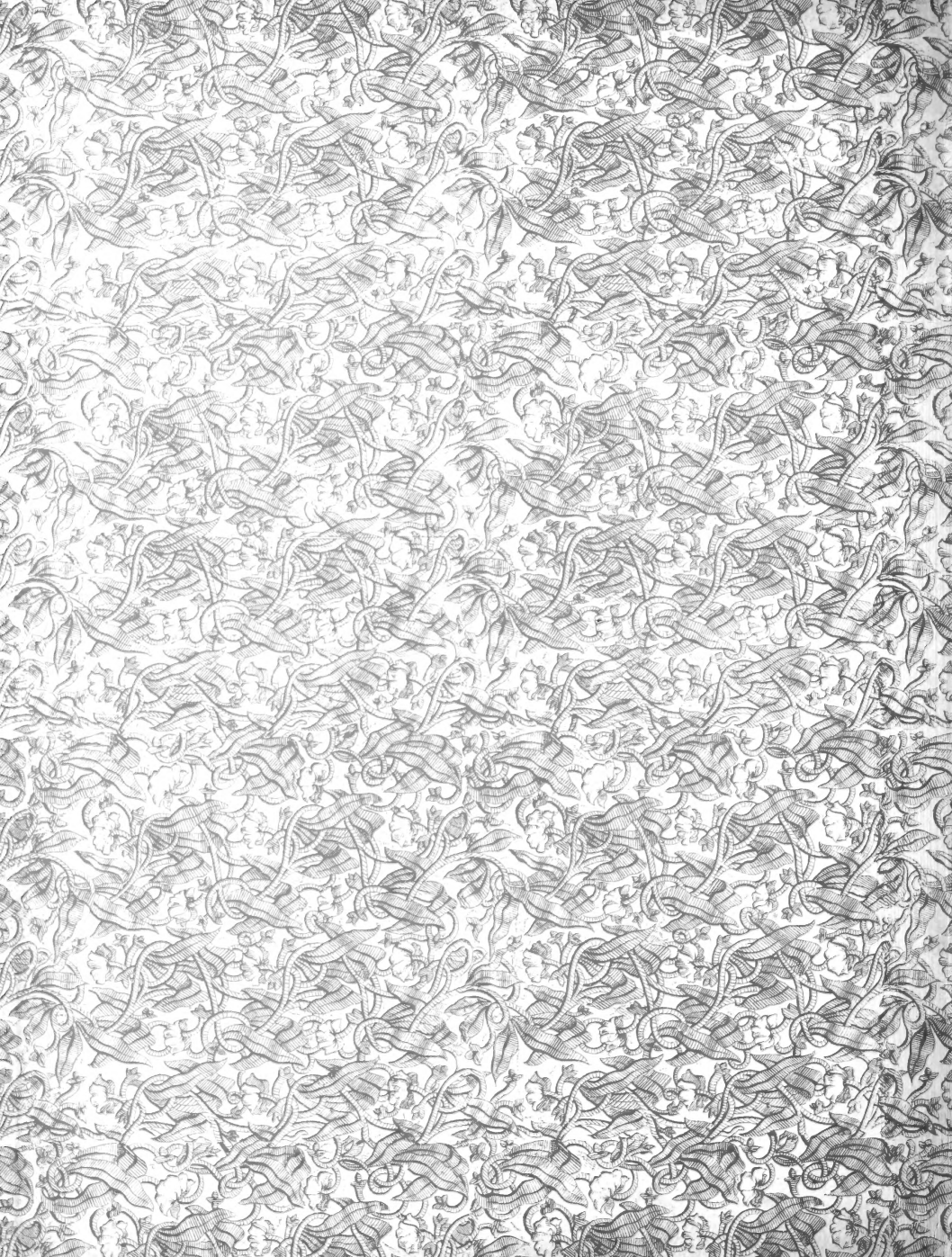


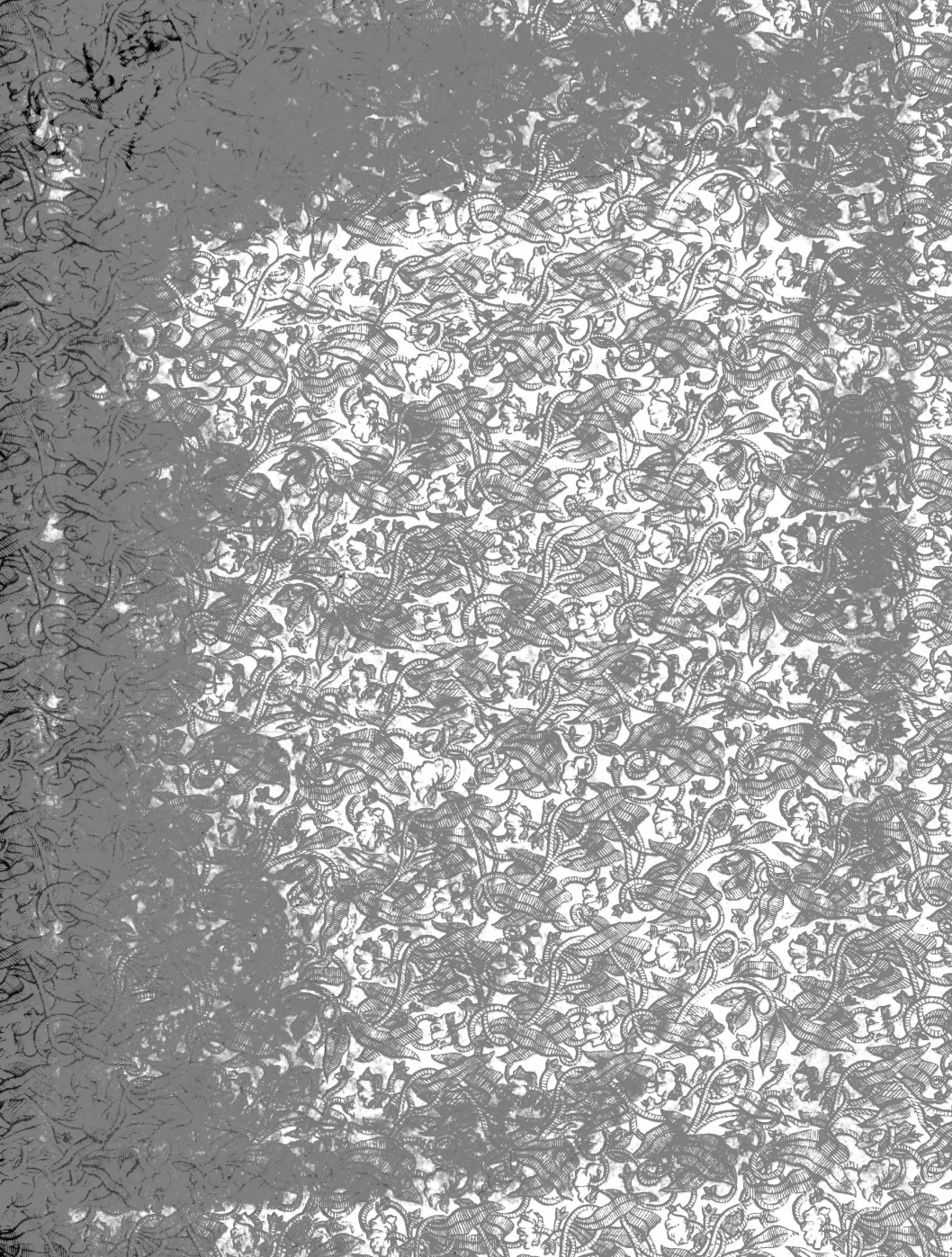
The

Golden Age

By

JOHN WRIGHT





6 volumes.

Water / Water



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5. *H. niger maximus*.—*Christmas Rose* (centre). 6. *Michaelmas Daisies* (*artistic additions*).





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1. Général Jacqueminot. 2. Madame Lambard. 3. La France.

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THE
FLOWER GROWER'S GUIDE

BY
JOHN WRIGHT, F.R.H.S.

EDITOR OF THE "JOURNAL OF HORTICULTURE," "GREENHOUSE AND WINDOW PLANTS"
AND "THE FRUIT GROWER'S GUIDE"
AUTHOR OF "PRIMER ON HORTICULTURE," "GARDEN FLOWERS AND PLANTS"
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With Coloured Illustrations

BY MISS GERTRUDE HAMILTON AND MISS MARIE LOW

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NUMEROUS ILLUSTRATIVE DIAGRAMS BY F. W. BURBIDGE, F.L.S., GEORGE SHAYLER, F.R.H.S.
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DIV. I.



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THE FLOWER GROWER'S GUIDE.

INTRODUCTION.

OF the progress that has been made in floriculture during the past quarter of a century there can be no two opinions. It is exactly summed up in the favourite ejaculation of the old schoolmaster in Scott's novel, "Guy Mannering," and that is, "Prodigious!" Horticulture has advanced by leaps and bounds, yet not spasmodically; there has been no reaction, and this marked progress shows no signs of diminution. Nor is this great and well-sustained advance largely due to what may be termed extraneous aids; in other words it has not been fostered to any appreciable extent either by royalty or the upper ranks of society, but is the outcome of a great and ever-increasing love of Nature and Nature's products, among the middle classes more especially. The prolonged agricultural depression has naturally left its mark on some once-famed gardens of the "upper ten thousand," whose incomes are mainly dependent on the produce of their farms; and if these gardens are not so well maintained as in bygone days, it is not the result of lack of interest, but insufficiency of means, and this we will hopefully regard as a temporary inconvenience. When, however, we come to discuss what has taken and is taking place in the gardens of our merchant princes, of our business men, and the educated classes who are in receipt of good salaries, and therefore in a position to devote a portion of their income to the pursuit of some favourite hobby, it is then we plainly see what extraordinary strides floriculture has made.

Thousands upon thousands have found that a garden is one of the best and cheapest luxuries that anyone can well indulge in. Those who have gone intelligently to work, whether on a large or small scale, have not been long in discovering what a source of pleasure has been tapped, what a never-ceasing round of enjoyment the cultivation of "Flora's brilliant race" is constantly unfolding, and what a "thing of

joy" a well-kept garden proves to be, irrespective of its size. With many hobbies or pleasurable pursuits monotony often becomes apparent and leads to apathy, but this cannot be said of flower culture, for it is here, indeed, true "that the appetite grows with what it feeds upon." There is no monotony in flowers, they are ever unfolding new charms, developing new forms, and revealing new features of interest and beauty to those who love them. The cultivation of flowers, comparatively speaking, is not an expensive indulgence. This remark holds good whether the proprietor of a house can afford to employ an experienced head gardener and assistants, or is well content to do the greater part of the work in a garden with his own hands. Indeed, it is owing to the latter class joining the ranks of gardeners—as amateurs of course—in such great numbers, that is to be attributed so much of the progress in horticulture of late years; and it is these, probably, who derive the most good and real pleasure from flower culture. It is scarcely possible to over-estimate the beneficent effects of gardening upon the brain-workers of the nation who have suburban or rural homes, while the pleasure pertaining to the delightful pursuit is shared in by every member of the family. It is an exercise that affords the most wide-spread satisfaction, and no occupation or profession allows greater scope to the individual. Full advantage is taken of this fact. Thus we have men who are so skilful in the growth of one or two particular classes of plants that they gain an enviable reputation for their ability to excel all rivals; others have developed wider range of cleverness, while still more succeed in doing everything they undertake most creditably. It is among professional gardeners where we expect to find the most varied knowledge and skill displayed, amateurs rightly confining their attention to a more limited number of species and varieties; if too much is attempted the chances are that nothing is done well.

As before pointed out, it is among medium-sized and small gardens where the most extraordinary progress has been made. Where twenty years ago one plant-house was to be seen there are nearer fifty now, and this great increase is principally due to the efforts of amateurs and the owners of suburban homes, where from one to six gardeners are kept. Even this estimate may be under the mark in some districts, and horticultural builders could, probably, give even more startling figures. There is yet another class of flower growers, and that an important one, to whom special reference must be made. The great demand for flowers has, naturally, had the effect of largely augmenting the ranks of market providers; and here, again, the progress is most satisfactory—indeed extraordinary. So great is the increase in this direction that it is

scarcely possible either to estimate its extent, or limit its scope. Flowers in great abundance must be forthcoming for room and table decoration in the mansions of the wealthier classes, and those owning smaller houses must also have a proportionately lavish display, while the industrial classes are equally fond, and quite as determined to have their quota, of Nature's choicest gifts. This taste for house and table decoration, personal adornment, church ornamentation, and memorial wreaths and crosses, was never even approached in by-gone days, and it has led to a great industry being established, on which thousands of families depend for the necessaries of life.

Immense quantities of flowers have of late years been imported from the more southern European countries, and doubtless we shall continue to receive extensive consignments for some time longer. The date is not so very far distant, however, when we shall be much less dependent on large importations, as with the gigantic means for home culture, provided and in progress, it will become more and more difficult for foreigners to compete with us. It is not improbable that the tables may eventually be turned, and that we shall be in a position to supply other countries with some kinds of flowers. As a matter of fact, we could do so now with chrysanthemums, cyclamens, daffodils, and others, if they would let us compete on fair terms. It is now the fashion to compute the quantities of flowers sent from the Scilly and Channel Islands by the ton, and growers nearer London could also an extraordinary tale unfold, such as one of them spending nearly £20,000 annually in bulbs for affording flowers for sale, then throwing the "roots" away. It is scarcely possible to give a rough guess as to the amount of glass devoted to flower culture alone, but it covers hundreds of acres of ground; while the land devoted to the growth of hardy flowers for cutting, also to plants for sale and seed production, is still more extensive, amounting to thousands of acres.

In a brief review of the progress made, and improvements effected, among all classes of plants, the most fashionable, and, all things considered, the most beautiful family, namely, orchids, ought to occupy the premier position. It cannot be denied that the progress made with these, both as regards the introduction of new and beautiful species, and also the skill displayed in their culture, has during the past quarter of a century been marvellous. During recent years they have been imported in such large quantities—propagation also going on rapidly—that not only can they be bought at comparatively cheap rates, but cut flowers are also very abundant in the markets, and the supply will increase. Those occasional sales of very rare or choice specimens, when individual plants realise as much as £250, no more indicate

the state of the markets generally, than do the sales of pedigree stock suggest that serviceable animals cannot be bought for fewer shillings than are the pounds given for rarities. Orchids are really well within the reach of all fairly well-to-do persons, and, as will be shown when treated upon in this work, are not nearly so difficult to grow and flower as many seem to think. It is worthy of note that many superior forms have been raised in this country of late years. Amongst the pioneers of the hybridising movement is the well-known firm of Messrs. J. Veitch & Sons, King's Road, Chelsea, and many others are now successfully engaged in this delicate and highly interesting work. Several of the leading nurserymen largely import orchids, having their own travellers hunting for them in various, and hitherto but little explored, parts of the Globe. Foremost among these must be placed Messrs. Sander & Co., St. Alban's, Messrs. Bull, Veitch, and others also displaying much activity and enterprise in a similar direction. As a consequence, the commoner, yet beautiful, forms of many species are now obtainable at prices quite the reverse of prohibitive to growers of ordinary exotics, while every now and then the orchid world is startled by the introduction of some grand novelty, in few or large numbers.

The rose, however, if popularity is taken as a test, is still the Queen of Flowers, and the progress made with the flower, of which it is said "there is odour in the very name," has been eminently satisfactory. By far the greater number of the best varieties of hybrid perpetuals now in cultivation have been raised within the last twenty-five years; and, although to France belongs the honour of producing the majority of them, home raisers have done much of which to be proud. Such names as Bennett, Dickson, Paul & Son, W. Paul & Son, Postans, Prince, Turner, Ducher, Guillot, Levet, Lacharme, Margottin, Pernet, Schwartz, and Verdier, deserve to be handed down to posterity for good work accomplished in raising new and beautiful varieties. It is at rose shows, many of which have sprung up, including those of the National Rose Society, during the past few years, that the hybrid perpetuals are seen at their best, though not a few lovers of roses prefer to cultivate them in a less formal manner with a view to having masses of flowers in their gardens rather than a few prize blooms for exhibiting. The other sections, notably teas and noisettes, have not been neglected; in fact these are likely, as their merits become better known, to even eclipse the more showy hybrid perpetuals. There has also been a marked reaction in favour of old-fashioned, or what are termed "garden," roses; and even the sweet-briar has not been neglected, as witness the lovely hybrids raised by Lord Penzance.

Chrysanthemums have, perhaps, come more to the front of late years than any other class of plants that can be named. A National Society, and innumerable local societies, have been formed in honour of this "Autumn Queen"; and it is largely due to the influence of those societies that such extraordinary strides have been made. It is the Japanese section that has done so much to popularise the "Golden Flower"; but the improvement has been general, the different types having been taken in hand by such raisers, among others, as Beckett, Calvat, Boucharlat, Cannell, Davis, Délaux, Doughty, Jones, Lacroix, Laing, Pitcher and Manda, Owen, Salter, Sautel, Seward, Shea, Smith, Wells, and Spaulding. So many and diverse are the varieties in the different sections that it is now possible to have chrysanthemums from July till March, the blooms ranging from the size and form of a mop-head down to a button.

Carnations, likewise, merit a separate paragraph, not merely owing to any very marked improvement in the new varieties constantly added to the list, though these are decidedly good, but rather on account of the revived popularity of this serviceable class of flowers. So much are carnations appreciated, that numerous houses have been constructed in private gardens for their special culture on quite a large scale. The Malmaison group has been most honoured in this respect, and so greatly are these fine forms in demand, that we hear of market growers having as many as 30,000 plants under glass, solely for furnishing cut blooms. It is even more satisfactory to note that border carnations are much more popular now than for many years past, and of these there are now numerous excellent varieties available, while a great percentage of good flowers may be raised from a packet of seed. To a distinguished amateur, Mr. Martin R. Smith, the world is indebted for many beautiful carnations; Mr. James Douglas, of Bookham; Mr. Charles Turner, of Slough; and other florists having also been successful in raising varieties of permanent value.

Tuberous begonias may be said to be quite a modern flower. The originals from which the present grand strains have been worked up by Messrs. Laing, Veitch, B. R. Davis, Cannell, Ware, and others, are so poor and insignificant as to be only retained as curiosities. The magnificent varieties now cultivated represent in a striking manner the potency of pollen transference from flower to flower, as influencing the seed and producing varieties, double and single, in size and beauty such as were not dreamt of twenty years ago. Not till this very effective class of plants came to the front was the reign of "scarlet geraniums," or, more strictly speaking, zonal pelargoniums, threatened; but these have also been greatly improved. Every section has been largely

added to, and any that existed thirty years ago would, as a rule, present but a sorry figure alongside the best of the present day.

Of miscellaneous plants grown principally under glass, special mention must be made of the progress effected with amaryllises, gloxinias, clivias, bouvardias, fuchsias, cannas, azaleas, hybrid rhododendrons, calceolarias, Chinese primulas, cinerarias, Persian cyclamens, streptocarpuses, and violas; with such fine-foliaged plants as crotons, dracænas, caladiums, coleuses, and others; while the list of elegant palms and graceful ferns has also been considerably augmented. In fact, evidence of the attractive power of plants and flowers is apparent almost everywhere, and is afforded in many and varied ways—in the crowds, ever increasing, which cluster around the beautiful floral combinations in our public parks and gardens, or that scan the borders for the names of plants and shrubs that are grown there; in the enormous number of flower shows—spring, summer, and autumn—which attract, in the aggregate, hundreds of thousands of visitors; in the formation of floral societies and their long roll of members; in the establishment of amateurs' and gardeners' associations—those are only some of the outward and visible signs of the deep love for flowers and the strong desire for learning all that can be learned about them that exists among various classes of the community.

In the flower garden and pleasure grounds are now to be seen far more beautiful conifers, trees, shrubs, and flowering plants than formerly. The reaction in favour of herbaceous plants is specially noteworthy, while annuals in variety, pansies, violas, dahlias, and bulbous-rooted plants are all gaining in popularity rather than otherwise; in fact, everywhere instances are to be met with of a great love for some one or more of the kinds of plants named in the foregoing remarks, and in very many cases unmistakable evidence has also been forthcoming that sound and trustworthy information as to the best methods of culture is much needed. What is wanted is now presented in the form of a guide that (as founded on successful experience) shall be helpful to various classes of flower growers, including market-gardeners, by giving all requisite cultural details, sufficiently illustrated to render the work instructive. This, with a series of coloured plates, should make the FLOWER GROWER'S GUIDE acceptable to owners of gardens, large or small, as well as to professional and amateur cultivators of the several plants and flowers that will be brought under treatment in its pages.

GENERAL CONSIDERATIONS OF PLANT LIFE.

“ Science is a bright light that illuminates the gardener’s path towards success ; but the pathway itself is good practice after all.”

IT is about a hundred years ago since Goethe,* the great German poet, who was very fond of plants, pointed out the important central fact that all the parts or organs of what we usually speak of as flowers, or blossom, or bloom, are really and simply mere phases or modifications of ordinary green leaves. In a word, there are green leaves for workaday purposes, and coloured or otherwise specialised floral leaves as if for high-days and holidays, but really for vital functional objects, as will be shown.

Mr. Ruskin, in Letter V. of his “ Fors Clavigera,” in alluding to Goethe’s work, says that the discovery was “ a true and a *notable* one, for as a matter of fact, you will find that all plants whatever are composed essentially of two parts, viz., the *leaf* and the *root*; the leaf loving light, and the root loving darkness; the one liking to be clean, the other dirty; one liking to grow, for the most part, up, and the other, for the most part, down, and each having faculties and purposes of its own.

“ But the pure one, which loves the light (the leaf), has, above all things, the purpose of being married to another leaf, and having child-leaves, and children’s children of leaves to make the earth fair for ever. And when the leaves marry they put on wedding robes, and are more glorious than Solomon in all his glory, and they have feasts of honey, and we call them flowers.”

This is not the time or place to teach the infinite details of botany, but every gardener and amateur should at least know the first principles on which all plants whatever are arranged. The first great division consists of the flowering and fruiting plants, and the second division is made up of the flowerless plants, thus :—

* See “ Metamorphoses of Plants.” English translation. Cox & Masters.

GENERAL ARRANGEMENT OF PLANTS.

DIVISION I.

COMPRISES ALL FLOWERING AND FRUITING PLANTS, WHICH ARE CALLED PHANEROGAMS.

SECTION I.

DICOTYLEDONS, OR EXOGENS.

These have two seed-leaves, or cotyledons; netted veins in their leaves, grow outwardly.

SECTION II.

MONOCOTYLEDONS, OR ENDOGENS.

These have one seed-leaf, or cotyledon, only; long and narrow straight-veined leaves, grow inwardly.

DIVISION II.

COMPRISES ALL FLOWERLESS PLANTS, OR CRYPTOGRAMS.

In this division are all Ferns and their allies, Selaginellas, Mosses, Seaweeds, and all kinds of Fungi, including Mushrooms.

Now, in the first group you will find most of the ordinary plants grown in gardens for use or ornament; while the second group includes plants that never bear flowers or fruits in the ordinary way, such as ferns and lycopods, mushrooms and toadstools, all the fungoid garden pests, such as those which attack the grape-vine, potato, and tomato "diseases"; and, lastly, the bacterial earth organisms belong to this group—the almost invisible and countless inhabitants of all good and well-cultivated soils.

DIVISION I.—FLOWERING PLANTS.

We will now proceed a step further, and point out that the great Division I. of the flowering and fruiting plants is again subdivided into two smaller groups or sections: the one having broad leaves, with netted or branching veins, and their seeds produce two seed-leaves, or cotyledons, when they germinate; hence the plants with netted leaf-venation and two seed-leaves are called Dicotyledons (*di* = two; *cotyledons* = seed-leaves). This same group is also called Exogenous (*ex* = out; *genous* = growing), because their growth, or the addition of new material, takes place between the wood and the bark, *i.e.* outside the stem.

The second subdivision of Group I., or flowering plants, has leaves generally very much longer than they are broad, with straight, or unbranched, veins; the cotyledon of the growing seed is solitary, *i.e.* one only, and the growth, or addition of new matter takes place in the centre of the stem, instead of the outside. This group is called Monocotyledonous (*mono* = one; *cotyledon* = seed-leaf), or Endogenous (*endo* = inside; *geno* = generated, or growing).

To Group I., with the netted veins, belong most of our garden plants, that is to say, nearly all our fruit-trees (except the musa, or banana), and nearly all the vegetables.

To Section II. of Division I., or Endogens, belong, on the other hand, all our true bulbous plants—the banana; all flowers such as iris, crocus, lily, amaryllis; all orchids and palms, and all such vegetables as leeks, onions and asparagus.

Then to the main Group II., or the Flowerless Plants, on the other hand, belong, as we have said, all the ferns, lycopods, or selaginellas, and the great family of fungi.

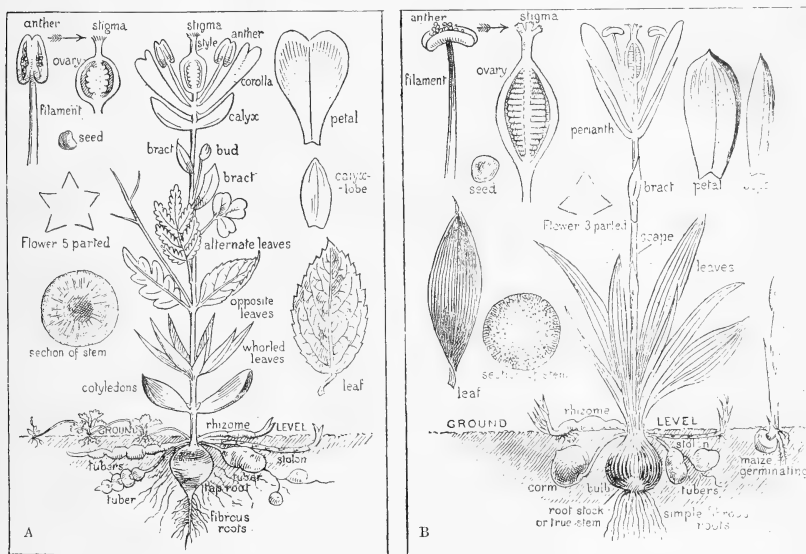


Fig. 1. PHANEROGAMS.

A.—Group I., netted veins.
Exogens = Dicotyledons.

B.—Group II., straight veins.
Endogens = Monocotyledons.

(After Goethe's *Urpflanzen*.)

or mushrooms. Bearing the above simple facts in mind, a child need have no great difficulty in referring all garden plants to the divisions to which they naturally belong.

DIVISION II.—FLOWERLESS PLANTS, OR CRYPTOGAMIA.

It is thought by some botanists that this division represents the earliest of all vegetation on the earth. They are all more or less fond of damp shady places;

many of the seaweeds and fresh-water algæ are aquatic, and some kinds appear to be self-luminous, while others possess the unique power of developing chlorophyll or leaf-green, though growing in dark places.

Though ferns, mushrooms (*Fungi*), and other cryptogams have no flowers in the ordinary sense, yet they possess organs analogous to flowers, and which perform similar functions in the perpetuation of the plants. You all know the clusters and lines of "spores," easily seen on the backs of most fern fronds. These clusters and lines really consist of groups of spore-cases (example 3 in the illustration opposite). When these cases are ripe they are hygrometrical, and burst open during wet or damp weather, and so liberate the spores. These spores then fall, or are blown or carried on to damp tree trunks, rocks, or soil, and begin to grow or germinate as shown in example 4. No cotyledons are produced as in the case of seeds, but merely a dark-green flat growth of cellular tissue called a prothallus, or first expansion (see Fig. 1 in the group).

On the under-surface, or at the back of the prothallus, organs analogous in a sense to flowers are formed. These are the antheridia, or male organs (analogous to the pollen of flowers), and the archegonia, or female organs, analogous to the ovary or seed vessel in flowering plants; so that fertilisation takes place in cryptogams *after* the germination of the spores. Spores, unlike seeds, have no cotyledons and are asexual (= vegetative) bodies with powers of cellular germination.

The fertilisation of flowers, however, takes place mostly in dry weather, but that of the flowerless plants is only possible during wet weather, which is the reason that all fungoid pests, such as the vine mildew, the potato, tomato, and other diseases of the same nature, increase most rapidly during warm wet periods in autumn.

On the back of the prothallia both antheridia and archegonia are formed when ripe, and fully-formed zoospores or antheridia are set free. These are spiral bodies furnished with eyelash-like cilia (example 5), which enable them to gyrate or twist themselves forward very rapidly in water, or on the dewy surfaces of leaves.

The female organs, or archegonia, are small raised bosses; a section is shown of one of them in example 6. There is a small pore or mouth-like opening, and a sort of a nucleus at the base of the orifice as shown. The prothallia are generally bathed with moisture, and by means of this as a medium the lively little antherozoids are enabled to enter the archegonium in the direction of the arrow, after which fertilisation is effected and young fronds appear as in example 2 in the group on the next page.

You will now see clearly how it happens that fern hybrids occur now and then, in nature, and even more freely in the garden where many different kinds of ferns are grown in close proximity to each other. The spiral antherozoids act perfectly automatically, so far as we at present know, and so they run into any pore or crevice of any archegonium near to them, and in this way it is possible for two species to be cross-fertilised and for fern hybrids to appear.

Fern growers apply this knowledge by sowing the spores of any species they wish to hybridise all together on a wet soft stone, or on the surface of a seed-pan or flower-pot. Or again, the spores of many species or forms are all mixed and sown together in the same

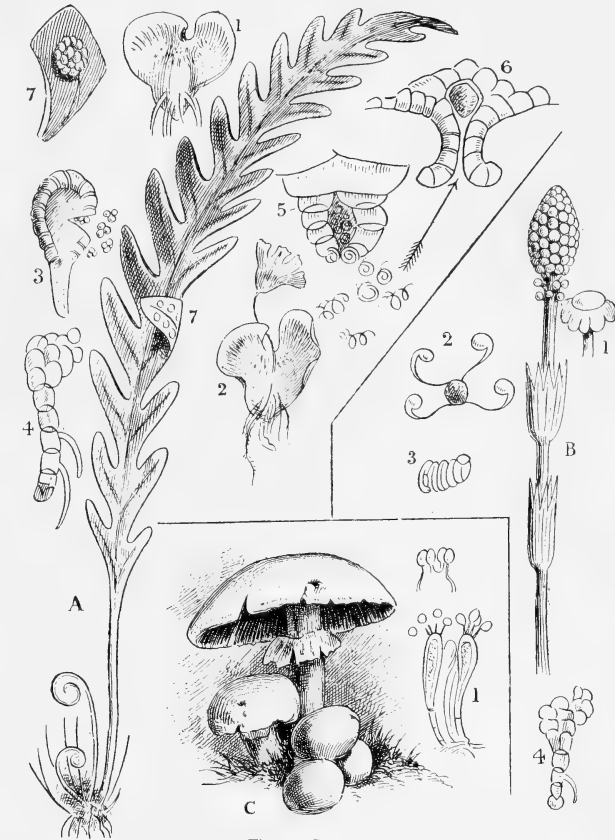


Fig. 2. CRYPTOGAMS.

A.—FERN (*Polypodium*). 1, Prothallium ; 2, prothallium with first young frond ; 3, spore-case, bursting open and liberating spores ; 4, spore germinating ; 5, antheridium containing male spores (= micro-spores) ; 6, archegonium or female organ ; 7, cluster of spore-cases on bit of frond. B.—HORSETAIL (*Equisetum*). 1, Spore yielding scale from conical head ; 2, spore with four elaters expanded ; 3, spore with elaters coiled up when dry ; 4, spore germinating. C.—FUNGUS or Mushroom (*Agaricus*). 1, Sterigmata and conidia, showing two basidia (cells), four conidia (spores) on each ; the spores when ripe give rise to "spawn" or mycelium.

receptacle, so that the chances of their being hybridised are multiplied as it were.

The case of ferns may serve as an illustration of cryptogamic fertilisation, which is in principle the same, but varies more or less in detail in other cryptogamic plants.

In the mushroom, propagation is carried on by spores (*conidia*), which give rise to the silvery cobweb-like mycelium, or real mushroom plant; that which is of economic interest to us in the shape of the mushroom itself being really the fruiting phase or state only of the fungus.

WHAT IS A PLANT?

When we come to ask ourselves the question, "What is a plant?" the answer is not so easy as one might at first suppose. A plant is a very variable quantity; indeed, it may be a single cell or two the size of sparrowshot, as in *Wolffia*, a kind of rootless duckweed, or it may be a giant forest tree composed of millions of cells, towering 100 to 200 feet in height, and weighing many tons.

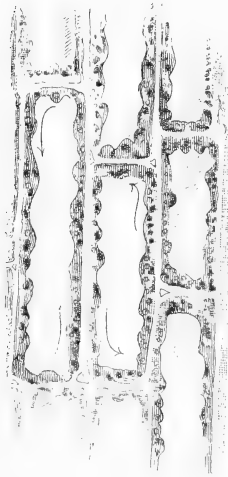


Fig. 3. FLOWING OR STREAMING PROTOPLASM IN VALLISNERIA (KEENER).

We may say a plant is a living organism, the *living* principle being protoplasm (*pro* = earliest; *plasma* = stuck together), and its active working principle is a form of protoplasm called chlorophyll (*chloros* = green; *phyllon* = a leaf), or green leaf.

Few more beautiful objects are revealed by a powerful microscope than the living and moving matter protoplasm, floating the chlorophyll grains through the cells of *vallisneria* in an ever-ceaseless round under appropriate conditions of temperature and healthy growth (Fig. 3). The lesson thus taught is that we must cherish the leaves of our plants, and by good culture enable them to do their wondrous work (see pages 19, 20).

It is very difficult at first sight to distinguish between some plants and the lower animals, such as the zoophytes. Animals, as a rule, however, have only one mouth; they ingest solid as well as liquid food, and can move about freely, and their digestive work is carried on in one large bag or stomach; whereas plants ingest their food by thousands of little mouths or pores (called stomata), and they can only take in food in a soluble state, that is to say, either in a liquid or in a gaseous form.

Then plant food is absorbed by the leaves from the air, food solutions are also

absorbed from the earth by the rootlets; but in both cases it finds its way into the inner cellular structure of the leaves, and it is therein chemically prepared, or digested, each of the thousands of cells in a leaf acting as a stomach. What these food substances are we shall state under the headings of Roots and Leaves.

Plants may be grouped into sections according to the time they occupy in perfecting themselves from seeds; or on account of their habits and behaviour under changes of climate. Thus, for example :—

ANNUALS are plants that grow from seeds sown in spring, and fully develop themselves within the year. Thus the whole growth cycle (Fig. 4) is completed, they germinate, grow, flower, and ripen seed during the warmer portion of the one year.

Examples of annuals are sweet peas, maize, and other cereals, peas and beans, nemophila, and (as usually grown) mignonette. Annuals of course generally die after ripening their seeds.

BIENNIALS are plants that may be sown at almost any season in one year, but they do not flower and ripen seed until the succeeding year. That is to say, biennials occupy the best part of two years in completing their growth cycle. The first year they save up reserve stores of food, and the second year they utilise it in perfecting their flowers and seeds.

Examples of such plants amongst flowers are Canterbury bells, honesty, sweet williams, foxgloves, and the evening primrose (*Enothera biennis*). Biennials generally die the second year after ripening their seeds, but do not always do so.

PERENNIALS are plants that live at least more than two or three, and possibly for many years, and they do not die after having flowered and seeded as annuals do always, and biennials do very frequently.

Like the biennials, this group may also be divided into those that retain their foliage fresh all the year (evergreens) or that shed their leaves, or die down to the ground line on the approach of winter, in which case they are called herbaceous.

Evergreen perennials are such plants as hellebores, saxifraga and megasea, arabis, aubretia, violets, pansies, and others of a like nature. *Herbaceous* perennials are pæonies, delphiniums, and most composite or daisy-flowered plants, such as helianthus, pyrethrum,

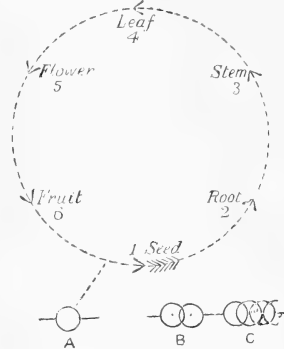


Fig. 4. COMPLETE CYCLE OF PLANT GROWTH. A, annual. B, biennial. C, perennial.

asters or "Michaelmas daisies," and all others with stems that perish yearly, fresh growths issuing from the root stocks in the spring.

BULBOUS PLANTS (Fig. 5 and page 9).—These, without exception, belong to the

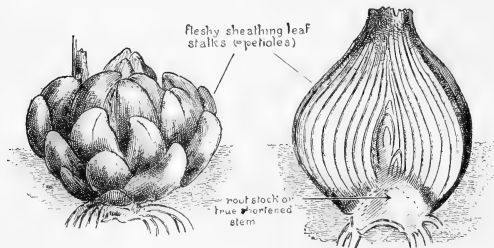


Fig. 5. SCALY BULB (LILY).

TUNICATED BULB (NARCISSUS).

Monocotyledons, and have narrow, straight-veined leaves. *Iridaceæ*, *Liliaceæ*, and *Amaryllidaceæ* are natural orders, almost entirely composed of bulbous plants. Note carefully that a bulb is a shortened stem, having axillary buds, both stem and buds being covered with fleshy or tunicated sheaths or fleshy scales. These fleshy sheaths or scales are really flattened leaf stalks or petioles, utilised as stores for starch, sugar, and other surplus plant food; hence in buying bulbs you are really purchasing stored-up sun energy, ready for floral development.

TUBEROUS PLANTS.—These are any plants whatever, having shortened fleshy (not scaly) stems below ground (see illustrations page 9), such as potatoes, *Carex tuberosa*, some oxalis, gloxinias, dahlias, and many others. Some plants now and then produce tubers above ground, just as bulbs or bulbils are produced on the stems of some lilies (*Ex. L. tigrum* and *L. bulbiferum*).

RHIZOMATOUS PLANTS (Fig. 6) are those having thick horizontal stems, creeping either above or below ground level, such as Solomon's seal; iris, of the so-called "German" or bearded section; *Saxifraga peltata*, *Rogersia podophylla*, and others. Rhizomes

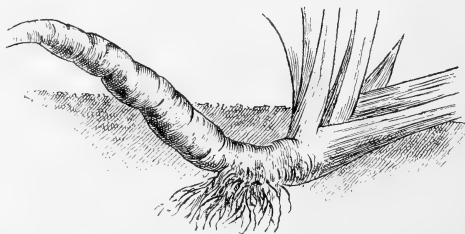


Fig. 6. RHIZOME (IRIS).

bear leaves on their upper surface as a rule, while tubers as a rule do not do so, otherwise a rhizome is analogous to an elongated or creeping tuber.

TREES AND SHRUBS.—All these are hard-wooded perennials, and trees represent for us the tallest and longest-lived of all plants. Any hard-wooded plant growing more

than 20 feet in height may be called a tree, and shrubs are really small, spreading trees, less than 20 feet high, and they form branched stems rather than solitary stems, or trunks, or boles.

Trees and shrubs are *evergreen* if they retain their leaves green throughout the winter, and *deciduous* if they shed them on the approach of frost. They may be of all forms or shapes, such as pyramidal, as in conifers; columnar, as in Lombardy poplar, cypress, and others; spreading, as in oak and sycamore; weeping, as in some varieties of birch, elm, willow, etc. Pollarded trees are those whose trunks or boles are periodically topped or thinned, or denuded of branches.

Roots.

These are the first growths produced by the germinating seed, and their functions are at least threefold in character. Their primary object is to serve as food-seekers and absorbers of water from the earth, holding as it does various soluble food salts in solution. Though roots absorb soluble nitrates, they are really drinking organs, most of the solid matter (95 per cent.) found in adult plants having really been absorbed from the air by their leaves.

Roots also act as grapplers, or anchors, by which most plants, and even large trees, are held firmly in the ground in an erect position. In rocky places it is often wonderful to see the beautiful adaptability of tree and shrub roots, as they clasp and ramify over huge stones, and take firm grip in the smallest of crevices. The curious manner in which plants grow from seeds on old walls, ruins and towers, afford striking proof of root adaptability.

The growing points, or root-tips, are the most plastic and active, as they stitch or wriggle through the soil, and these growing points are highly sensitive to their surroundings. So much so, that Darwin has pointed out that if it should ever be possible to discover anything in plant life analogous to a brain, it would be found to exist in these root-tips, that, under some conditions, actually seem to think and reason as well as feel.

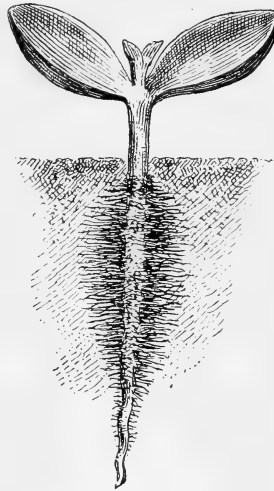
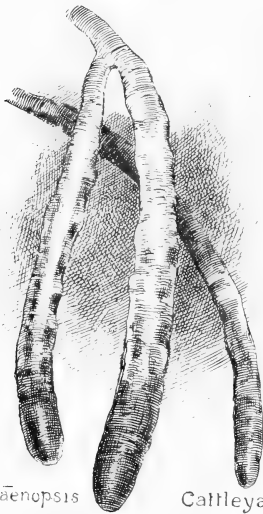


Fig. 7. SEEDLING PLANT.

Showing radicle with root-hairs and two seed leaves or cotyledons.

The most active and absorbent portions of roots are the parts just behind the growing points or the portions usually thick-set with root-hairs (see Fig. 7). Although most roots are buried in the ground, we must never forget that roots must breathe, and that they will soon die in close stagnant soils. Roots may be choked or drowned in soils that are not permeable to the air, and hence the necessity of drainage in flower-pots and the free passage of water through garden soil; then air follows the water under atmospheric pressure of some 2,000 lbs. to each square superficial foot.

In some natural orders of plants, such as in the orchids, bromeliads, also many ferns and lycopods, in aroids and many tropical creepers, we find roots especially adapted for partial exposure to light and air. If you look carefully at many orchids,



Phalaenopsis

Cattleya

Fig. 8. AERIAL ROOTS (ORCHIDS).

such as cattleyas, vandas, phalaenopsis, and dendrobium, you will find roots of two kinds, viz., those embedded in the pot or basket of compost which are generally etiolated or blanched, and mainly serve for firm anchorage and the absorption of water, and the aerial roots which are silvery white with green growing points to them (Fig. 8). These last absorb not only water, but ammonia and carbonic dioxide, having, in fact, a partial leaf function as well as a partial root function.

STEMS.

These are, roughly speaking, of two kinds, namely, those usually produced above the ground, and those formed for special purposes below the ground level. When stems are subdivided, the divisions above ground are usually called branches, and branches are developed buds that may form in the axils of all leaves. Sometimes axillary buds do not elongate, but become fleshy, as in the case when bulblets or tubers are formed on the stems of some lilies and other plants.

Stems may be woody or herbaceous, and either simple or much branched. Tall-growing, woody stems are protective; they also act as conductors of sap or earth salts in solution, as it is attracted from the roots towards the leaves. Stems also act as receptacles for the conservation of the formed or elaborated materials, such as starch,

after it is made by the leaves (see page 19). The budding and branching of stems is highly necessary in order to enable most of the many thousands of leaves on large shrubs and trees to obtain a full share of air and sunshine, otherwise they cannot do their important work. All stems are herbaceous in their youngest stages, *i.e.* composed of soft cellular tissue, and bast or vascular tissue, but when strength is required the elongated vessels become solidified or filled up, and what is known as woody fibre is the result.

A *cutting* is any portion of a stem or root that is cut off for purposes of reproduction. A shoot is any long, straight, sappy branch from the stem; a “sucker” being similar, but it springs from the root or stem underground.

A *slip* is a twig or small branch torn off with a heel, and a *truncheon* is a thick stake-like branch driven into the ground to grow, as in poplar, willows, osiers, and mulberries. As a broad rule, the parts of plants selected as cuttings, or as scions, are either the soft young, or “herbaceous” growths, as in carnations, pelargoniums, calceolarias, fuchsias, etc., or the hard and ripened wood, as in grape-vines and many shrubs and trees, such as willows, tamarisk, roses, etc.

In many cases thick roots may be inserted as cuttings, as in Japanese anemones, *Senecio Tyermani*, yuccas, dracænas, aralias, etc., as these roots

develope adventitious or accidental buds under well-known conditions of heat, light, and moisture. So also as scions for grafting, one may take either soft young shoots (herbaceous grafting) or hard shoots in early spring. *Grafts* or scions are cuttings joined on to another stem or root as a stock, instead of being inserted in soil so as to root directly into the earth.

Buds, generally speaking, are all axillary, *i.e.* they spring from the axil of a leaf or its stalk or petiole, but “adventitious buds” may appear on stems, roots, or any other portion of a plant. A “bud,” as used for propagating purposes, as in stone fruits and roses, is a bud cut with a strip of bark adjacent, and then slipped into a T-shaped incision in the bark of a suitable stock.

Bulbs are all endogenous, *i.e.* they have straight-veined leaves, *not* netted ones. They

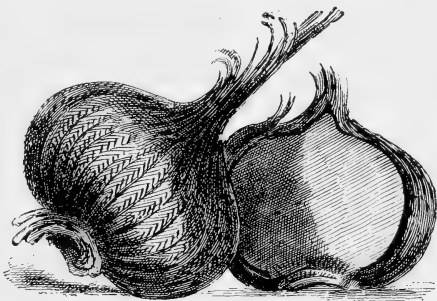


Fig. 9. CORMS (GLADIOLUS).

are not flower "roots," but usually underground stems, scaly as in lilies, or having sheathing coats or tunics, as in narcissus (see page 14), hyacinth, tulip, and others of a similar character.

Corms look like bulbs somewhat, but have fibrous or membranous coats enfolded round a solid centre, as crocus, gladiolus (Fig. 9), and others possessing the same characteristics. All true corms are endogenous.

Runners are long flexible shoots bearing young plants (*i.e.* growing buds) at the nodes, as in strawberry, some potentillas, and geums (see "ground level" A, Fig. 1, page 9).

Stolons are leafless shoots similar to "runners," but produced underground, as in bamboos, convolvulus, physalis, and lily of the valley (Fig. 1, page 9).

All parts of a plant are really buds in different phases of development, and sometimes may be produced in different positions, as in lilies. *L. candidum* has underground bulbs; so has *L. bulbiferum* and *L. tigrinum*, but the two last also produce axillary buds or bulbs (bulblets) on their flowering stems. Again, seeds are buds produced by a union of the sexual organs of plants, and ultimately become detached and distributed to continue the race.

LEAVES.

The root and the leaf are the real working machinery of all plants; but we must remember that, in function, roots, stems and leaves are now and then interchangeable—that is to say, they occasionally perform each other's work. Some plants (1) are *rootless*, for example, as *wolfia*, some *utricularias*, *aldrovanda*, and others; and then all the food collection and absorption is done by the stems and leaves. Then (2) we have some orchids, cacti, *euphorbias*, etc., that are practically *leafless*; but there is a plentiful supply of chlorophyll in their stems, and so life and health are maintained. Again (3), there are one or two orchids, such as *Angræcum funale*, and *Aerides tænale*, that depend entirely upon their aerial roots, which, in the case of all *Epiphytal* orchids, are, or should be, rich in chlorophyll.

Leaves then, or those parts of a plant which contain *active green matter*, are actually the absorbing, digesting, breathing, and evaporating organs of the plant machine. Leaves are really the analogue of our mouths and lungs and stomachs and skin combined.

No matter how variable they are in size or in form or in numbers, their real life's work is all done on the same plan. Their work consists in the formation of proteids or carbohydrates, such as starch (Fig. 10, next page), sugar, and other compounds, also to lay

up stores of carbon, partly for the individual good of the plant itself, but mainly for the good of the race, *i.e.* of its own seeds and offspring. Note that starch and all other plant products are really made or formed in the green leaves, but that they are transformable, and may be stored up or used in or by any organ as part of the plant.

Let us glance at the structure of the leaf, and see how its work is done. As everyone should know, leaves are generally flattened expansions of the stem, covered on both sides with a skin or cuticle of water cells, this skin being full of holes, or mouth-like pores, called stomata (*stoma* = a little mouth). There are hundreds or thousands of these pores (Fig. 11) on every square inch of ordinary leaves, as you may see if you skin off a bit of leaf, and put it under a good microscope. A crinum, or lily leaf, shows them plainly, with a good platyscopic lens.

In hydrangea and syringa (lilac) there are one hundred and fifty thousand or more of these pores or mouths to the square inch.

Leaves must be large or full-sized, healthy, and clean, in order to do their best work. They require all the sunshine available short of scorching, blistering, and other physical injury, caused by a lack of moisture at the roots, or enfeebled growth in a too close and vitiated atmosphere under glass. Seeing that each leaf depends for its full action on the thousands of stomata which stud its cuticle, you will at once perceive the need there exists for syringing, sponging, and otherwise cleaning plants that grow under glass, or in or near

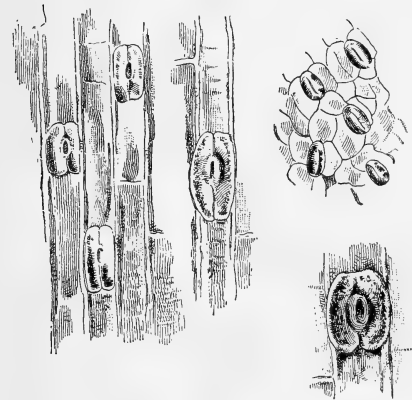


Fig. 11. STOMATA.

Opening and closing pores in the outer coverings of leaves for purposes of absorption, exudation or evaporation.

dusty roads and smoky towns. Much of the freshness and successful cultivation in the town squares and public gardens in Paris and elsewhere on the Continent is due to

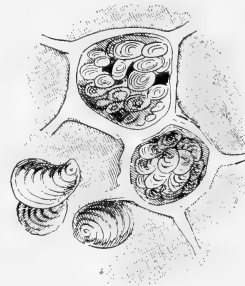


Fig. 10. STARCH GRANULES.

As stored in the cells of tubers, seeds, or round the buds in matured wood.

the organized and constant use of the hose-pipes every early morning and evening during the warm summer season.

We make a section of a leaf, and then find something like this figure, if we magnify the thin transverse section. At *a* is a thin layer of water cells, which sucks in the carbonic dioxide ($C O^2$) from the air through the stomata already mentioned.

Below, at *b*, is a double series of erect or palisade cells, filled with protoplasm and chlorophylli (see page 12). This "living green" cell material has a strong affinity with the carbonic dioxide, and abstracts it from the water cells at *a*, and by the energy of sunshine this "living green," or chlorophyll, acts chemically upon it, reserving the carbon of which it forms sugar and starch granules (page 19) and other necessary materials.

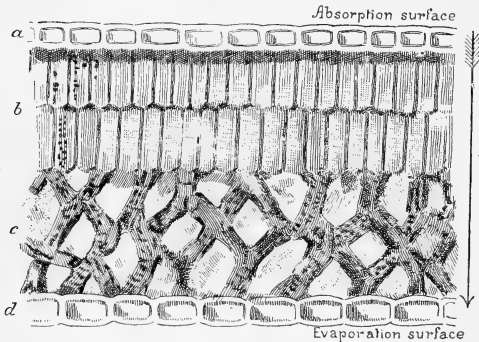


Fig. 12. SECTION OF PORTION OF A LEAF.

a, water cells; *b*, palisade cells; *c*, absorption cells; *d*, evaporation cells.

Then the use of the lower spongy portion of the section at *c* comes into action. It absorbs all superfluous water, oxygen, etc., and these are ultimately evaporated through the lower series of cells at *d*. In this way, many tons of carbon are taken in by leaves of all plants, especially by the enormous leaf area of our largest trees, and tons of water and oxygen are daily evaporated from the leaf

laboratories of our woods and gardens, after the elaboration of carbonic dioxide in the way we have shown.

Under the heading of Roots, at page 15, you have read of the absorption of water containing earth salts in solution, and it is from these simple chemical materials absorbed by root and by leaf that all the manifold vegetable products of the world are made.

You will now perceive why Ruskin, Darwin, and others of our wisest and most thoughtful men have always spoken and written so highly of roots and of leaves. Some of us are apt to think more highly of flowers for beauty, or fruits for use; but before we can ever have these in perfection the roots and the leaves must be strong and healthy and clean and well fed, both in garden and in the field.

It is necessary to know that "chlorophyll" is the real working power in all green leaves, and we must take care that our plants are grown in deep, rich, well-worked or otherwise suitable soil; the roots must breathe as well as drink, and the foliage must be clean. If the leaves of plants are not fresh and green, but yellowish or pale and flaccid, then there is something wrong—want of drainage at the root it may be, or lack of iron sulphates, or there may be too much lime in the soil or in the water, in which case all ericaceous (heath) plants, such as rhododendra, fail to thrive.

FLOWERS.

The flower of every plant consists as a rule of four kinds of organs, each intended to serve some useful or essential purpose.

First of all comes the calyx leaves, which are mostly green and stout in texture, their duty being to enfold and protect the inner and more delicate organs of the flower in the earlier stages of growth.

Secondly, come the petal leaves, which are larger than the calyx, generally of a different shape and more brightly coloured. These leaves act as advertisements, and with honey, attract the visits of insects to the flower, so as very often to insure cross fertilisation.

The third group, or whorl in the flower, is composed of stamens, little yellow knobs, called anthers, on slender stalks called filaments. The anthers are two-celled and contain the powdery fertilising dust called pollen.

The fourth and last organ in the flower is the seed-vessel or ovary, called in its young state the pistil. The pistil consists of a rounded receptacle containing the young ovules; this is surmounted by a slender column or filament called the style, and at the upper end of the style is the stigma (see Fig. 13, also page 9).

In most flowers the male organs or stamens, and the female organs or pistils, are borne together in the same flower; and flowers of this kind are called hermaphrodital flowers.

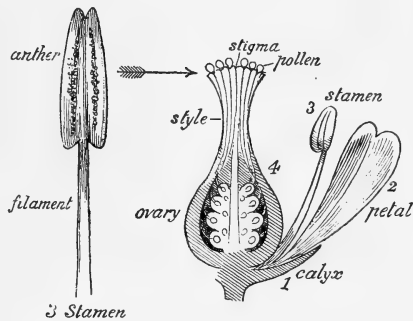


Fig. 13. ESSENTIAL PARTS OF A FLOWER.

In cucumbers and melons, castor-oil plants, begonias, and some others, the male and female organs are borne in separate flowers on the same plant, and such plants are called monœcious or unisexual flowers.

Then again, we have plants like hemp, hops, nepenthes, and the common aucuba, that bear male flowers or stamens on one plant, and seed-bearing pistils or ovaries on another individual plant, and such are called diœcious plants.

Of the four whorls or rows of organs in an ordinary flower, note that the calyx is protective, and the corolla or petaloid-whorl is attractive, then the third whorl of stamens is masculine, and the ovary or seed-vessel is feminine.

In order for a plant to bear fertile seeds, it is necessary that the pollen should fall or be placed on the stigma at the right time, and in nature this is done either by the wind, or by the bees, flies, or moths, which flit from one flower to another for nectar, honey, or pollen.

All the fir-trees, or coniferæ, and all the cereals, or corn plants or grasses, are wind-fertilised (anemophilous). On the other hand, many daisy-flowered composites, indeed nearly all gamopetalous genera, are fertilised by insects (entomophilous), as also are the orchids and asclepiads, which have their pollen glued together into heavy waxy masses, and not powdery as in most other flowers. As a rule, in nature, the pollen of one species or kind of plant is blown or carried to the stigmas of the same species growing in the vicinity, the result being individuals of the same kind or species.

CROSS FERTILISATION.

Now and then, however, the pollen of one species finds its way to the stigmas of another species in the vicinity, and then, if seed is produced of the union, the plants are different to either parent species, and are called hybrids. Darwin long ago pointed out the fact that "Nature abhorred perpetual self-fertilisation," and it is now known that she refreshes or rejuvenates herself or her offspring by cross-fertilisation, or by hybridisation now and then. Nature also abhors perpetual vegetative reproduction, especially so unless occasionally refreshed by changes of soil and climate, hence the necessity for fresh soil or change of seed.

Man has adopted nature's tactics in the garden, and is continually altering or varying, and very often improving, his vegetable produce by cross-fertilising or hybridising the flowers, fruits, or vegetables he cultivates for use or ornament.

In crossing or hybridising flowers, all that man can do is to transfer the pollen from the anthers of the selected male parent, and place it upon the stigmas of the plant

selected to bear seeds. Man applies the pollen (magnified at *a* in Fig. 14), and nature does the rest.

After the dust-like pollen is applied to the receptive stigma (*b*), it actually begins to grow. A thread-like tube is shot out of the pollen grain, in a similar way to the protrusion of the radicle by a germinating seed. This tube forces its way down through the spongy, cellular tissues of the pistil or style, and eventually reaches the ovules, or embryo seeds in the ovary. The point of the pollen tube enters the ovule by a little aperture (*c*), called the micropyle, and some of its contents, or sperm matter, is conveyed to the germ matter in the young ovule, which at once begins to develop as a seed, having a living embryo that holds in itself the united characters of its two parents. But unless this fertilisation is effected, the ovules will wither and die.

“DOUBLE FLOWERS” have been forced out of their condition by the florist, through an excess of nutriment. The stamens and pistils have been transformed into petaloid segments. That the stamens most usually become changed into petals in our so-called “double” flowers is proved by the fact that all our most perfect double flowers belong to genera having polyandrous or many stamens in the same bloom, such as roses, pæonies, camellias, begonias, buttercups, and malvas.

When flowers are what is called “perfectly double,” both stamens and styles, or pistils, are petaloid, and then no seed is producible; but it often happens that semi-double flowers are now and then produced, flowers containing one or more perfect ovaries and styles; or one or more perfect stamens bearing fertile pollen, and then, of course, seeds may occasionally be produced. In roses, narcissi, hollyhocks, stocks,

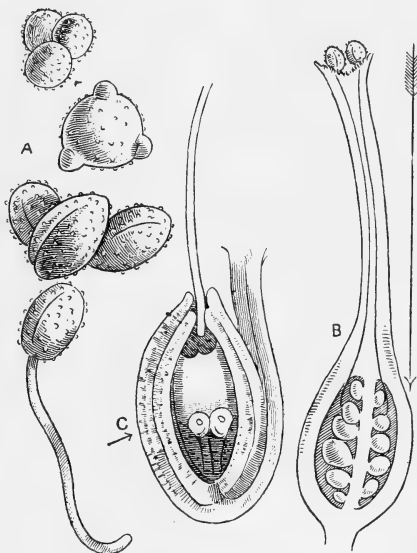


Fig. 14. FERTILISATION.

a, pollen grains (various), one growing; *b*, ordinary style, with two pollen grains growing; *c*, ovule being fertilised.

and various other flowers, this constantly takes place, and seeds producing double varieties are obtained.

Some double flowers, as the fuchsia, have the calyx normal. The petals are divided into segments, or multiplied in size and area, even if not in number; but the stamens and the pistil are normal or perfect, hence the so-called double-flowered fuchsias often bear seeds as freely as the so-called single varieties.

Apart from flowers that are more or less abortive and double, there are many flowers, especially among the composites, such as daisies, chrysanthemums, sunflowers, gaillardias, etc., which are not really, but only apparently double. Even the densely packed clusters of normal flowers of clover, sea hollies, and teasels, are now and then miscalled "double" by unobservant people.

We cannot do better than take a flower of the Chinese or Japanese chrysanthemum to illustrate our meaning. Now a chrysanthemum, in fact all daisy-like flowers, or composites, as the name implies, are not single flowers, but each flower head (*capitulum*) of a daisy or aster, marigold or sunflower, is really a collection of flowers tightly packed inside a common calyx (*involucre*) on what may be called the paint-brush plan.

Our illustration (Fig. 15) shows a section of a "single" (so-called) chrysanthemum, and a glance will show that the so-called flower is made up of many separate flowers, flowerets, or florets, of two kinds, the outer row or ray of florets being strap-shaped, or ligulate (*a*), and the central or disk-florets tubular (*b*). The whole are held together by a short tube-like involucre at *c*. There are three main types of these compound or composite flowers, viz.: the type illustrated by the figure having florets of two kinds, ray and disk florets in the same head; the common hawk-weeds and the dandelion have heads composed of many strap-shaped florets only; and if you look at our common garden weed, the "groundsel," you will find it has all tubular florets and no ray florets at all.

FRUITS.

The flower, after pollination, is naturally followed by the fruits or seed vessels, under normal or favourable conditions. But under abnormal or artificial conditions, as in fruit houses and conservatories, the cultivator has often, in the absence of wind and insects, to facilitate the distribution of pollen at the proper time, *i.e.* when the stigmas are receptive, so as to insure a crop of fruit or of seeds. Wherever hive bees are kept or their visits not prevented, they do much service in the "setting" or fertilisation of flowers, but failing these, a soft brush, such as a rabbit's tail tied on a stick and deftly

drawn over the flowers, is an efficient means of fertilising those from which fruit or seed is required. (*See* Pollination, &c., pages 29—31.)

Botanically, any seed or seeds, no matter how large or small, hard or tender, with their coat pod, capsule, or other receptacle, is called a fruit.

SEEDS.

Seeds are fertilised buds generally borne inside some sort of a fruit vessel or ovary, from which receptacle they eventually become detached and escape and fall upon the

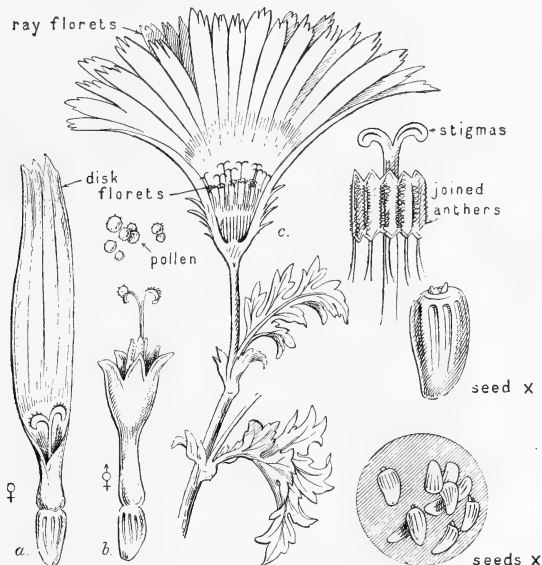


Fig. 15. SECTION OF A CHRYSANTHEMUM FLOWER.

a, female floret of the ray ; *b*, hermaphrodite floret of the disk ; *c*, calyx or involucre.

surface of the ground, where under good conditions they grow and increase, or at least perpetuate the parent plant. When perfectly ripe and dry, seeds may be stored in a cool, dry, and airy place until required for sowing, and some albuminous seeds may be kept for years in a growable state if it is desirable to preserve them. Seeds will, however, germinate long before they are ripe and dry enough for keeping purposes, and in some cases we may adopt with advantage nature's plan of sowing seeds as soon as

they are ripe enough to grow, scattering them very thinly in good, rich, well-tilled ground.

We must select the finest, *i.e.* the largest and heaviest seeds, which are generally those that first ripen on the plants. We must save our seeds from our finest varieties and best plants, and thin out the crop so that those ripened may be of the best quality.

Do not sow seeds too deeply or too thickly. Over-crowding in the early stages is worse than a waste of seed, for it ruins millions of plants yearly, as shown in Fig. 16; they should appear thinly and grow sturdily from the first by the better method also shown. A good start in life is as good for a seedling as it is for a child.

Heat is of such importance, even to hardy seeds, that a word or two as to this may be desirable. Under glass one may readily regulate the temperatures, but in the open air we can only modify cold by judicious shelter. Hardy plants and their seeds require a temperature of the soil of from 50° to 65° in order to germinate. We must never

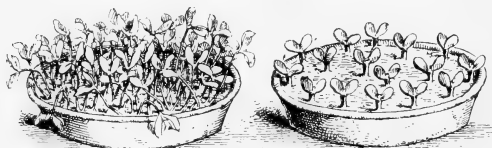


Fig. 16. RAISING SEEDLINGS (BAD AND GOOD SOWING).

forget that young plants like young animals require a temperature rather higher than that absolutely essential for the life progress of adults. Sub-tropical or green-house plants require from 55° to 65°, and tropical or stove plants from 65° to 90° of soil heat in order to germinate strongly and well. Some tree and shrub seeds lie dormant one year in the ground, and such are often buried or "stratified" in trenches or heaps a year before they are sown in the usual way.

PLANT BREEDING AND VARIATION.

The first step in plant amelioration or improvements is judicious selection. Plant breeding is really and truly evolution as carried on in the garden by man. The results obtained are wonderful, but these are but trifles as compared with the potentialities that yet exist—the virgin fields as yet unworked in the plant world. The tuberous-rooted begonias, the cannas, and the Persian cyclamen, are results obtained within the past thirty or forty years, and if we compare drawings of the flowers every ten years or so, since the improvements began, we get an object lesson that is both suggestive and instructive. Here are engravings of the two first and most potent

species used by Seden, Laing and others in originating the present magnificent race of tuberous-rooted begonias.

The first species was a succulent but rather weak-habited branching plant about 2 feet in height, viz., *B. boliviensis*, introduced in 1864. It had drooping, rather close sepaled, orange-red flowers. Then came *B. Veitchi* in 1867, a plant with fleshy-rounded radical leaves, and two three-flowered radical scapes of bright red, broad sepaled flowers. The first hybrid, however (*B. Sedeni*), was the result of a cross effected between *B. boliviensis* and *B. species*, and shown in Fig. 18; it was a deep rosy variety, not very much superior to the wild *B. boliviensis*; but this was a start, and growers became alert and active, then by crossing and selecting from *B. Sedeni* and



Fig. 17. IMPROVING FLOWERS. BEGONIAS.

First species (on the left), *B. boliviensis*, 1864; next (on the right), *B. Veitchi*, 1867.

its parents, and from other species, such as *B. roseiflora*, *B. Pearcei*, *B. Veitchi*, *B. Davisi*, and a few others, our present splendid varieties have been obtained.

Apart from hybridising, however, a careful selection of seedling plants often results in very fine forms. The scarlet *Anthurium Schertzerianum* is a case in point. Like the *Lapageria rosea* its spathes vary much in size and colour. As originally discovered in Guatemala and Costa Rica, prior to 1857, it was so small and weedy-looking that one or two collectors passed it by and would not trouble to add it to their collections. As figured in the *Botanical Magazine*, t. 5319 (Vol 88), its spathes are scarcely more than one inch in length by three-quarters of an inch wide; but by good culture

and careful seed-raising it has improved so much that several varieties now grown, including Ward's and Cypher's, have spathes at least 6 inches long by 4 or $4\frac{1}{2}$ inches in width.

The calceolaria, again, as introduced from South America about 1820-30, has been much hybridised, selected, and improved by good culture. In our illustration, Fig. 19, A shows one of the earliest wild species (1823); B, a good florist's variety of 1841; and C, a much-improved form of ten years ago, showing that under garden evolution it is "a slipper flower" no longer; the gain in size and colour, with dwarfness and sturdiness in habit or growth of the plants, being little short of wonderful.



First hybrid, *B. Sedeni*, 1870, from *B. Boliviensis*
and *B. species*.

Begonia Queen Victoria, 1888 (J. Laing).
(One-third natural size.)

Fig. 18. PROGRESS IN BEGONIAS.

One peculiar feature in connection with plants that have been long cultivated and much altered or improved by cross-breeding, is their habit of "sporting" or suddenly producing vegetative or bud varieties. Instances are well known in the case of chrysanthemums, azaleas, camellias, roses, and other garden flowers. This bud variation or "sporting" is by some believed to be a relaxing or disassociation of parental characters previously acquired by adding them together in the case of hybridism and cross-breeding. The most remarkable thing about sports is their appearing simulta-

neously in several places about the same time. Of course in some cases the several plants that do this have been distributed from the same source, but this is not always so. For the present we may consider bud sports to be “reversions,” or a backward struggle towards nature’s equilibrium.

POLLINATION.

The practical art of cross-fertilisation is quite simple. Having carefully selected both parents, you have only to imitate the bee or the flies, that carry the pollen of one flower to the stigmas of another nearly-related blossom on another individual plant, and there you are—success or failure, you can do no more for the time being.

Take a single rose, for example. In order to obtain hybrids, you first of all pull out all the anthers of the flower that is to bear the seed as soon as the petals expand, or even before. This is to prevent the flower being self-fertilised before you apply the pollen of another species or variety of rose to the cluster of stigmas in the centre of the flower.

On the next page is an engraving of a sweetbriar showing the parts of the flower, Fig. 20. By hybridising this species with the Austrian copper rose, Lord Penzance has raised a beautiful and fragrant race of hybrids within the last few years. Having

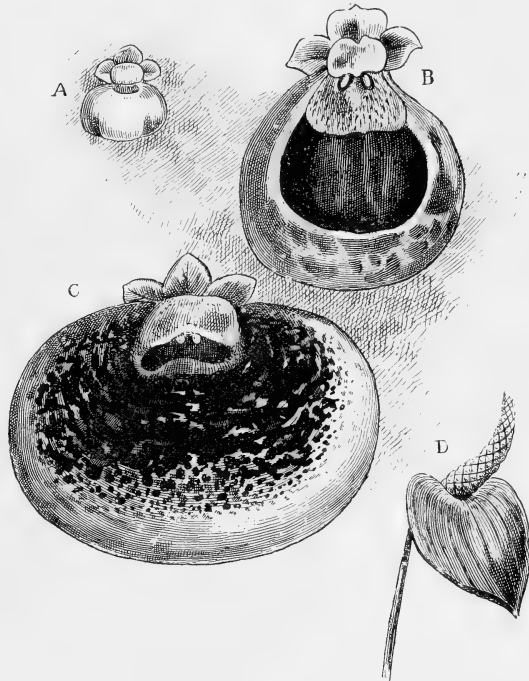


Fig. 19. CALCEOLARIAS: PAST AND PRESENT.

A, *Calceolaria arachnoide*, 1823; B, *calceolaria*, good variety of the year 1841; C, *calceolaria*, improved type, 1880; D, size of *Anthurium Schtzerianum* in 1860; size in 1890, 6 inches by $4\frac{1}{2}$ to 5 inches, the result of selection and cultivation.

removed the anthers from the seed-bearing flower, you apply the gold dust-like pollen from the male or father plant, with the effect stated and shown on page 23.

This may be done with a clean sable pencil, or with a pointed stick or a shred of bamboo, but do not make it too sharp-pointed, and then if you dip the point in water and butt it gently on a hard surface, you will separate the fibres of the bamboo and form a neat little brush that is both handier and cleaner than a sable or camel-hair pencil.

When you propose to use your bamboo points or brushes (Fig. 21) for removing

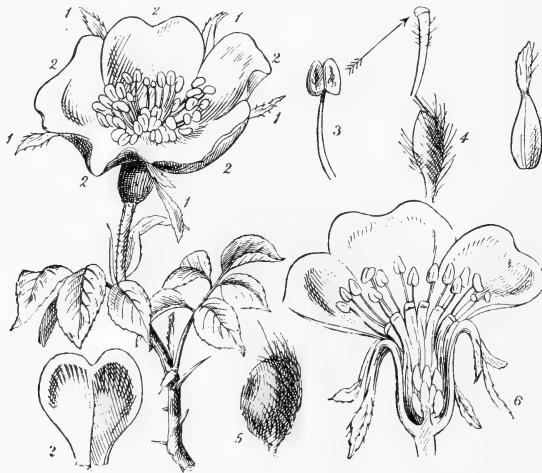


Fig. 20. *ROSA RUBIGINOSA* (Sweet Briar).

1, Sepals; 2, petals; 3, anther; 4, young carpel; 5, ripe carpel (seed); 6, section of flower.

pollen, first dip the stick into the tube of a fuchsia or any other nectar (honey) yielding flower, as this not merely causes plenty of pollen to adhere firmly to the stick, but it also facilitates its growth when applied to stigmas that are smooth and dry. The stigmas themselves may be lubricated with flower honey before putting on the pollen, with advantage. Observe carefully that the pollen is ripe, in which state the grains are easily separable and of a golden yellow, red, or bluish colour, generally yellow.

Another main point is to see that the stigmas of the seed parent are in a fully-developed and receptive state. This is generally indicated by the surface being fully

expanded and hairy or sticky, so as to hold or retain the pollen when placed upon it. In some flowers, such as lobelia, mimulus, tobacco, petunia, and composite flowers, the lobes of the stigma are widely separated when receptive and closed before that time. In mimulus (musk and monkey flowers) the lobes of the stigma are like lips, and actually close and retain the pollen when it is applied to them.

In the case of large flowers like amaryllis, lilies, and the larger narcissi, no stick is necessary. Simply pull off a long-stalked anther or two, and dab it on to the sticky or glutinous end of the pistil or stigmatic surface. In removing the pollen-bearing anthers from plants to be crossed, a small pair of tweezers will be found handy, or a pair of sharp-pointed scissors may be used to deftly snip them away.



Fig. 21. FERTILISING APPLIANCES.

a, Needle mounted in handle; *b*, bamboo toothpick for conveying pollen to stigma.

In crossing the flowers that have long tubular corollas, you can either cut them off carefully, or slit up the tube with a pin or needle pushed into a bit of stick as a handle (see *a*, Fig. 21).

FERTILISATION OF ORCHIDS.

In crossing orchids the tactics are a little different than in dealing with the majority of garden flowers, as the pollen is in waxy masses (see Fig. 23), and the stigmatic surface is in front of the fleshy column, and below the anther or pollen-case, which terminates the column itself (see page 33). In the case of the orchids no removal of pollen (or emasculation as it is called) is necessary, since the pollen cannot usually be blown, or shaken, or fall on to the stigmatic surface. In nature, orchids and asclepiads (*loya*, *stapelia*, etc.) are nearly always cross-fertilised by insects that carry the pollen masses about from flower to flower. If ever you get big humble-bees in the orchid-house when cattleyas, *lælias*, *dendrobiums*, and other kinds are in bloom, you will see them blundering about and creeping into the rolled-up lips of these flowers (Fig. 22), and they often carry off the sticky pollen masses on their hairy heads, and succeed in spoiling many flowers by fertilising them.

This brings us to a point in floral fertilisation worthy of notice. Whenever orchid flowers, and some other flowers, are fertilised they soon droop and wither away. The very reason why these flowers endure fresh and fair from four or five days to twelve

or fourteen weeks in our hot-houses is because they are *not* fertilised. In Borneo, India, Java, and in tropical South America there are plenty of insects as well adapted for fertilising orchids as our native bees are for fertilising clover and other of our native flowers, and so they do not remain so long in beauty there as they do in our gardens; what really happens to orchids in our glass-houses, where insects are kept at bay and



Fig. 22. *LILIA ANCEPS* "STELLA."

1 1 1, Sepals, or 3 outer segments of the perianth; 2 2 2, petals = 3 inner perianth segments, the lower changed in form and called the lip or labellum.

The humble bee groping after nectar in the lip hides the column and anthers and spoils the flower.

no fertilisation takes place, is this—the flowers go on patiently waiting for a marriage priest that never comes.

Here is an illustration of a flower of the great moth orchid (*Phalænopsis grandiflora*) of Borneo, showing the separate portions of the flower and the pollen masses, together with the stigmatic surface, just below the anther-case in the bottom corner to the right of Fig. 23, next page.

On the left (example 3) of the illustration you will see the shield-shaped staminode

(false or aborted stamen) of cyripedium, and just below this organ is the spoon-shaped stigma, the lower rounded surface only of which is receptive or stigmatic. In cyripedium two out of the three anthers are developed; viz., one on either side of the staminode behind, and the pollen can be easily taken off with a toothpick, as it is of a stiff treacle-like consistency. Cyripedes, calanthes, disas, and a few others, flower in two or three years after sowing, and are, for that reason, the best kinds for the new beginner to try his hand upon.

After fertilisation the flower soon withers, and the fleshy ovary or seed capsule

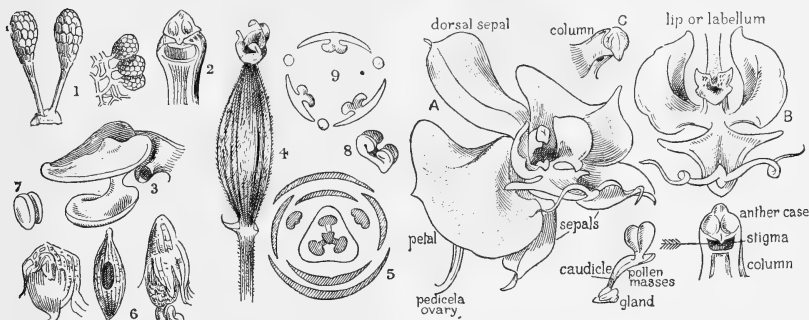


Fig. 23. FERTILISATION OF ORCHIDS.

1, Pollen masses of orchids (Pollinia); 2, column and anther case of lœlia; 3, staminode and stigma of cyripedium (the dark spot is the pollen); 4, fruit of *Cyripedium barbatum*; 5, diagrammatic section of flower of cyripedium; 6, orchid seeds (various); 7, pollen masses of dendrobium; 8, pollen masses of lœlia; 9, diagram (section) of orchid fruit.

A, *Phalenopsis grandiflora* (complete flower); B, lip or labellum; C, column or anther case.

The arrow pointing from the pollen masses with caudicle and sticky gland shows the darkened stigmatic cavity into which the pollen masses are placed for fertilisation. The inside of this cavity is very sticky for the retention of the pollen.

swells rapidly, but the seeds are not ripe until the capsule becomes dry and begins to split open. At this stage you must watch them carefully, or the fine mahogany sawdust-like seeds will escape and be wafted all over the place. If this happens, most of the young seedlings will be lost even if the seeds grow at all; but now and then seedlings appear in the most unlikely places, generally a damp spot on the walls, on moss-covered pots or baskets, or on the rotten woodwork of doors or wall-plates.

When the seeds are ripe they must of course be sown carefully, and as a rule it is best to sow them at once on a moist surface. A sod of fibrous peat, with some chopped living sphagnum lodged into it by watering with a rose, makes a good seed-bed; or

advantage may be taken of mossy blocks, or baskets in which plants are growing that will not need removal for a year or more.

Beginners at the fascinating game of rearing seedling orchids cannot do better than consult Mr. Harry J. Veitch's classical paper, in vol. vii., Part or No. 1 (1886) *Journal of the Royal Horticultural Society*, London, where the whole subject is treated and illustrated in a clear and masterly manner. If possible also obtain as complete a list of orchid hybrids as possible,* so as to see the best combinations as to parentage already made, and so avoid much useless labour and care.

AN AFTER WORD.

As will already be perceived, and as will become more apparent as our love of flowers and gardens increases, and our knowledge expands, the propagation, culture, and improvement of plants is one of the most satisfying and intellectual of all human occupations. It is a precious possession and glorious mission to be able to secure so much beauty from our mother earth for adding to the brightness and sweetness of our homes and the happiness of life.

Then we have to remember, and the thoughtful student will soon appreciate the force and truth of the great fact, with all its potential influences, that among plants nothing is meaningless nor vain. Every fibre within the soil, and every feature, even every hair on the growth above it; every curl, twist, bend or wrinkle in root, or leaf, or stalk; every line or spot of colour in a flower, are letters, and words, and phrases in the wondrous book of nature which is always open to us. If we will but study its pages we shall obtain a broader and truer conception of beauty, for we shall recognise the significant fact that all beauty whatever has a deep-laid law beneath it, there is no such thing as beauty for itself alone. "Perfect beauty is perfect fitness for a perfect use," and this is peculiarly apt and true of the beauty in flowers that may be grown in gardens over the length and breadth of the land.

Books of reference for those anxious to further pursue the above subjects :—

"The Story of the Plants." Grant Allen. (George Newnes, Ltd.)

"Physiology of Plants." Sorauer and Wiess. (Longmans.)

"The Natural History of Plants." F. W. Oliver. (Blackie.)

"Treasury of Botany." Lindley and Moore. (Longmans.)

Johnson's "Gardeners' Dictionary." 3rd ed. (George Bell & Son.)

* "The Orchid Hybrids." Hansen. (Dulau & Co.)

FORMING AND FURNISHING GARDENS.

IN commencing to build it is obviously of the first importance to secure a sound, firm, lasting foundation. It is true that this is not always provided in these jerry-building days, and someone has to suffer eventually. So-called "cheap," slipshod work cannot be permanently satisfactory in that reference, and such work is the dearest in the end. It is precisely the same in preparing sites for gardens. Many of these are, however, disappointing, not so much through lack of will to prepare them well and plant them wisely as through lack of knowledge. The desire may be great to have everything done properly, and with that view a "gardener" is employed; but the fact should be recognized that there are shoddy gardeners in and near all large towns as well as shoddy builders. This fact renders it necessary that all owners or occupiers of gardens, whether these are in the course of formation or established, should have the means of acquiring information on subjects in which they are interested—a "guide" to which they can turn to lead them in the right way from the commencement of operations till they reach the goal of success.

TOWN GARDENS.

Town gardens are the most appreciated of all. On many of these is bestowed more watchful care, more anxious thought, and, it must in all fairness be added, more mis-directed energy, at times, than is the case with the majority of other gardens—especially when the relative areas are taken into account. In many instances too much is attempted. Instead of cutting up the small plots of ground that constitute town gardens into numerous walks, beds, and borders, or adopting some fanciful design, it would be more conducive to enjoyment if the centre were kept clear and grassed down. It is true this would involve mowing, but the modern handy little machines do their work well and easily if only the grass is not let grow too long before it is cut. If properly managed these neat well-shaven lawns can be walked upon and enjoyed in nearly all kinds of weather. If flower-beds must be had, a few of these, plain in outline, might be cut out of the turf, though broad outside borders next the boundary fences would, as a rule, afford ample space for the cultivation of climbers, shrubs and flowers.

Those who prefer gravel walks can form these between the borders and the central expanse of turf. On turning to the series of designs given on the next page, it will be seen there is plenty of scope for laying out even a garden measuring not more than 50 feet by 20 feet in a pleasing manner with walks, borders, bower, summer-house or greenhouse complete.

SUGGESTIVE DESIGNS.

In *Garden A* we have a design that comprises a central grass plot, or this may be utilised for either flower or vegetable culture. The borders on each side of the pathway would be appropriately filled with either shrubs, fruit trees, or the two in mixture, against the dividing fence, with herbaceous and other flowers nearer the front. In the left-hand corner a span-roofed greenhouse, 12 feet by 9 feet, could be erected, and in the opposite corner there would be room for a deciduous tree and shaded seat underneath—enough altogether to afford enjoyable occupation for an enthusiastic amateur, and much pleasure to his family. (See references under illustrations.)

No provision is made for a greenhouse in *Garden B*, nor for a grass plot, though there is nothing to prevent and much might be said in favour of having turf instead of gravel walks. It is a question of keeping. If grass is kept close and smooth, it is generally more agreeable than gravel, but if neglected and the lawn is lumpy and coarse, gravel is preferable to the grass. Two circular beds, each 7 feet in diameter, could be effectively planted with a variety of tender summer-flowering plants followed by spring flowers, bulbous-rooted and otherwise, all of which will be treated on in due course. The central rectangular bed, measuring roughly 10 feet long and 7 feet wide, would be available for roses, carnations, dahlias, or other favourite flowers. The side borders would be in the straight $4\frac{1}{2}$ feet across, this allowing of a width of 2 feet for the walks, but another half-foot taken from both the borders and central beds would give a better width (3 feet) for the walks. In the side borders could be planted a few deciduous trees next the fence, preferably of species that are showy when in flower, and it is possible to have them of both an ornamental and serviceable nature—crabs, apples, pears, and cherries; these are highly attractive when in flower, and not less so when well furnished with fruit. At the farthest end from the house it might, in many positions, be possible to plant suitable forest trees for forming a screen with a few evergreens in front. The path could be taken to one of the spreading trees, and there a seat be placed, while at the opposite corner room might be found for

two small garden frames or a single three-light frame for raising flowers in spring and, if desired, growing cucumbers or tomatoes in the summer.

In *Garden C* a rustic summer-house occupies the most prominent position, the walk

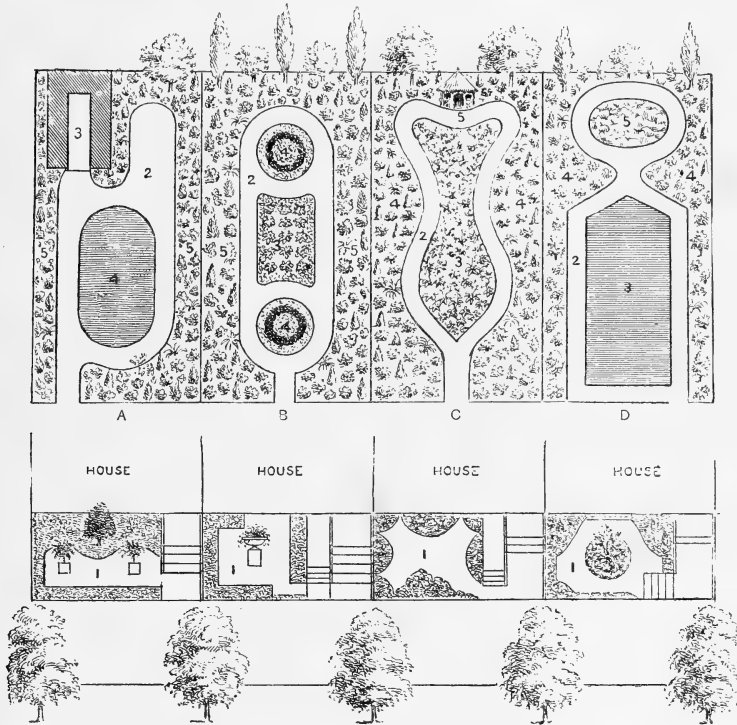


Fig. 24. A GROUP OF TOWN GARDENS.

1 1 1 1 Forecourts, and gardens in the rear of houses. Garden A.—2, path; 3, greenhouse; 4, grass-plot; 5, shrubs and flowers. B.—2, path; 3, hardy flowers; 4, bedding plants; 5, fruit trees, shrubs or flowers. C.—2, path; 3, mixed flowers; 4, shrubs; 5, summer-house. D.—2, path; 3, grass-plot; 4, shrubs and flowers; 5, rock-work.

Scale $\frac{3}{8}$ -inch = 12 feet.

affording a pleasant promenade to and from this resort. In this instance, again, the walk is only 2 feet wide, and would probably be found more enjoyable if made one foot wider. The central bed would be admirably adapted for herbaceous and other hardy

and half-hardy plants, of which there are abundance easy of culture, nearly or quite as attractive and far more serviceable generally than the tender bedding plants. At the farthest end from the dwelling-house two deciduous trees, as shown in the design, could be planted, and a few other standard flowering trees at the back of the borders generally, if the position is not too much shaded, with deciduous shrubs interspersed and fronting them. The best place for a frame, or even a small greenhouse, say about 10 feet long and from 6 feet to 8 feet in width, would be in one of the corners on either side of the steps leading from the dwelling-house to the garden, the walks being diverted, or the central bed narrowed, if sufficient room might not be otherwise provided.

On reference to *Garden D*, it will be seen that provision is made for a good breadth of turf, or the same space might be devoted to either fruit or vegetable culture according to the taste and inclinations of the proprietor. There is yet another alternative, namely, a central standard and four bush apples or pyramid pears—one in each corner, in small circular beds on grass. In the side borders half-standard fruit or deciduous flowering-trees could be planted, and a few herbaceous and other flowers between them. Where the border widens considerably evergreens should be planted with a view to screening the walk surrounding the rock-work in the centre. A central deciduous tree, such as a scarlet chestnut, in the background affords a good position for a seat, the other columnar trees, such as poplars, forming a screen of foliage during a period of six months. Whether the rock-work shall be planted with British ferns or devoted to flowering-plants generally ought to depend upon circumstances. Ferns succeed in the shade, and during the hottest part of the year present a cool, attractive appearance. Many alpine plants (of which selections will be given) are extremely beautiful, succeeding well in sunny positions, and do not require to be very often disturbed.

FORECOURTS.

The FORECOURT GARDENS are necessarily of limited area, but they can yet be effectively arranged and planted. In that of *House A* the tradesmen's entrance may be from the side, and the front garden on the ordinary ground-level, with steps leading up to the front door. A holly or other evergreen hedge next the road ensures privacy, and in the irregular border next the house, either flowers or low shrubs, with a central pyramidal holly, may be grown. The open space may be gravelled and a pair of yuccas or other hardy ornamental plants or shrubs can be grown in tubs. In the forecourt of *House B* the tradesmen's entrance and area steps are necessarily in the front of the house, but the garden is

on the road-level, space for affording light to the ground-floor window being walled off. A screen or narrow evergreen hedge could be planted right up the tradesmen's entrance, entering the forecourt from the first wide step. Flowers and shrubs can be planted in the borders, also ivy; roses or other climbers for the walls, and in the open gravelled space a vase could be placed. *House C* is not supposed to have any ground-floor window to mar the effect of the forecourt garden, the tradesmen's entrance being under the front-door steps. The clear space may be gravelled over, and the irregular borders formed all round converted into a rockwork for ferns and other appropriate plants. *House D* has the advantage of a side entrance. The front door and drawing-room are only slightly raised above the road-level, and the forecourt sunk 2 feet or so below that level, steps leading down into it from French windows and a passage to the front door. In the centre a small flower-bed, 4 feet in diameter, may be formed; and in the borders a ground-work of ivy, with yuccas and other ornamental hardy plants, would bear inspection. The best trees, shrubs and flowers for town gardens, with cultural instructions, will be duly set forth.

PRACTICAL WORK.

Far too many town gardens are practically spoilt by builders and others who first set feet on the ground. Where there is any turf this is often sold, and not unfrequently with it also goes what little soil there is underneath of a fertile nature. Instead of this robbery every square of turf and spit of good surface soil should be wheeled back to where the garden is to be formed, and only the sub-soil and other excavations carted away. Where the position is low or the sub-soil of a clayey nature, at least one drain should be taken through each garden at the outset, as this cannot well be done after the house is ready for occupation. These drains may be formed with 4-inch pipes, and should vary in depth from 30 to 36 inches according to the outlet. Either sods grass side downwards or a few stones or brick-ends ought to be placed over the pipes, especially where there is much clay, for preventing the joints becoming clogged in the near future.

If the ground happen to be fairly level the first proceeding should be to stake out the walks as well as the site to be covered by a building of any kind; then remove the surface soil from those portions and spread it over the plots and borders for increasing the depth of fertile free-working soil there. When there are many irregularities to

contend with, including several good-sized mounds, then a different method of procedure will be necessary. A thorough examination of the surface, including the heaps, ought to be made with a view to prevent burying the good soil. If there is any such in the hollows throw it out, fill up with poorer soil from the heaps or ridges and cover this with the better soil. Should the surface of the ridges consist of good soil and that underneath be poor (gravelly, clayey, or chalky), take care to use the poor only for filling up deep hollows, reserving all that is of a fertile character for the surface.

Seeing that the walks are not extensive, it may be advisable to double dig the whole of the ground before staking out, as the work might then be done more quickly and thoroughly. Next stake out the walks, which really means the beds, borders, and grass plots at the same time, and spread the top 9 inches from their sites over the beds and borders; any part intended for grass will probably be quite good enough already. It is the shrubs and herbaceous plants that will stand in the greatest need of an extra depth of fertile soil, and they also look better when this is raised above the general ground level. If there happen to be a heap of decaying turves left behind, save some of this for potting purposes, also for mixing with the soil in which carnations, roses, and fruit trees are to be planted.

In most cases it will be found that the ordinary soil is very poor, the bulk of it not having been long exposed to pulverising influences, and, therefore, not capable of properly supporting plant life. With a view to correcting this bad state of affairs an attempt should be made to improve it by the addition of a few loads of the best loam that can be bought, one cart-load, equal to about ten wheel-barrowfuls, greatly improving an area 20 feet by 10 feet. Also add about one cart-load or a ton of town or stable manure to every 120 square yards. If the ground is heavy, road sweepings, fine ashes, sand, and sifted mortar rubbish, may be used even more freely, trenching and mixing all well together. If rhododendrons, kalmias, Belgian azaleas, and other North American or bog plants are to be grown these should be planted in peat principally, though they would eventually succeed in loamy soil if there is little or no lime in it.

Forcecourt gardens ought to have quite as much pains taken in their preparation, as nothing will long thrive in the poor, thin, and shallow-dug soil that contractors, and not a few jobbing gardeners, would leave or plant in if left to their own devices. After all it is only a very small sum that need be expended in this direction, if the work is judiciously managed. Especially ought there to be a good depth of fresh, moderately rich soil next the walls and fences, as it is there where a variety of climbers or fruit

trees will have to be planted. Clematises are grand plants for festooning windows, doorways, rustic arches, and making boundary fences beautiful (*see* Fig. 25). These simply revel in a deep rich root-run, and so also do roses; and sticking these in small holes filled with fresh compost would answer for a short time only, while planting in poor thin soil is bound to end in disappointment. Advice upon forming lawns, grass-plots, walks and drives will be given under separate headings.

A pleasing example of a town garden is represented in the illustration, and though



Fig. 25. TOWN GARDEN, WITH BEDS ON GRASS.

the enclosure is small it contains features of interest of the nature previously indicated in agreeable association. It is a North London garden, in bright and refreshing contrast to hundreds of other so-called "gardens" of the same size, but which are little more than receptacles for rubbish. Mrs. Shirreff is to be congratulated on her bowery nook, with its well-draped fence, flower-beds, and greenhouse that cannot fail to afford pleasure as well as light and healthful occupation. It is what is called a garden "on grass"; the illustration on page 43 shows a garden "on gravel."

As showing how beautiful even a small suburban—practically a town garden—can be made by a combination of judgment, taste, and good management, the photographic illustration (Fig. 26) affords ample testimony. It will be perceived that gravel forms the base, and when this is kept smooth, clean, and neatly edged, the appearance is better than that presented by a faulty lawn. This photograph was taken in the suburbs of London, and quite near to large gasworks, and such a garden, under such conditions, is a notable achievement.

TREES, SHRUBS AND FLOWERS FOR TOWN GARDENS.

SCREEN TREES.—Few trees are, as a rule, needed in small gardens in or near towns, and these chiefly as *screens* from the “windows opposite.” The quickest “walls of green” in summer are formed by planting Lombardy poplars (*Populus fastigiata*) 3 to 4 feet apart, and trees 10 feet high or more can be had for a shilling each. They occupy the least space of all trees and answer the purpose in question admirably. Winter screens are much less needed, if at all, as gardens are little used during the dull period of the year, when light is the great essential.

Just as the poplar named is the best of trees for the purpose indicated for gardens in the rear of town and suburban residences, so for *small forecourts* or frontages, the mop-headed acacia (*Robinia inermis*) bears the palm. Trees with clear stems and round, compact heads are the least obstructive of all, and the leafage is decidedly elegant.

OTHER ORNAMENTAL TOWN TREES.—Where there is room for other moderate-sized trees, the following usually succeed in and near towns and are particularly beautiful in the spring:—Double and single scarlet and white thorns, almonds (in the south), laburnums, double-blossomed cherries (*Pyrus malus floribunda*), rose acacia (*Robinia hispida rosea*), the snowdrop tree (*Halesia tetraptera*), sea buckthorn (*Hippophae rhamnoides*), weeping willow (*Salix babylonica*), maiden-hair tree (*Salisburia adiantifolia*), mountain ash (*Pyrus aucuparia*), the purple-leaved plum (*Prunus Pissardi*), with compact growing varieties of apples, pears, plums, quinces, and medlars, the blossoms of which are so cheering in April and May, apart from their fruits in the autumn. It may be added also that the mistletoe grows and fruits well as established on an apple-tree in a London garden, the tree having been obtained from Messrs. Smith & Co., Worcester.

SHRUBS FOR TOWN GARDENS.—Among appropriate deciduous flowering shrubs are

lilacs in variety, gueldre roses (snowball tree), ribes (flowering currants), *Forsythia suspensa*, *Spiræa ariæfolia*, weigelias, hypericums; while elders green, golden, and variegated, grow in positions where most other kinds fail. Deciduous trees and shrubs succeed better than evergreens under a canopy of smoke, because the former cast the whole of their leaves at once in the autumn, and produce new leaves (breathing organs, etc.) in the spring (*see* page 19).



FIG. 26. TOWN GARDEN, ON GRAVEL.

EVERGREENS, so called because they retain their leaves in winter; but they cast them all the same, though gradually, during the spring and summer. In this respect they possess an advantage in smoky districts over coniferous trees, such as cedars, cypresses, and the like, also yews, which do not renew their "leaves" annually, as these are scaly extensions of the bark which hold sooty particles, and hence the trees do not thrive where smoke prevails.

CONIFERS.—There is one conifer, the deciduous cypress (*Taxodium distichum*), that

disrobes itself in the autumn and assumes a fresh bright green garb in spring, and on this account is often seen in excellent condition in gardens near towns—a tree fern-like in its elegance. Other conifers that may answer fairly well, especially if frequently washed with hose or syringe, are *Thuia gigantea*, *Cupressus Lawsoniana*, and *Thuiopsis borealis*.

Among the evergreens or sub-evergreens that grow well in town gardens where the soil is favourable are rhododendrons, hollies, box, privet (*Ligustrum*), euonymuses (green and variegated in the south), *Osmanthus illicifolius*, *Raphiolepis ovata*, aucubas, skimmias, andromedas, berberises, *Olearia Haasti*, and the sweet red and white *Daphne mezereum*. Ivies and shrubs for various purposes will be referred to in a subsequent chapter.

FENCES AND ARBOURS.—These are quickly clothed in town and suburban gardens with the rampant Virginian creeper (*Ampelopsis hederacea*), and the almost equally free clematises, such as *C. flammula* (Virgin's Bower), *C. vitalba* (Traveller's Joy), and *C. montana* (Mountain clematis); the beautiful varieties of the Jackmanni type (to be again referred to) also succeed in favourable positions; as do jasmices, honeysuckles, with such robust-growing Roses as *Amadis*, *Félicité perpétue*, *Aimée Vibert*, *Crimson Rambler*, *W. A. Richardson*, and *Gloire de Dijon*. They also answer for arches, as also do the sturdy growing ivies; while for arbours the old Tea tree (*Lycium europæum*) should not be overlooked.

FLOWERS.—Referring to flowers for town gardens it may be said that, provided the soil is good and freely worked, all kinds of hardy bulbous and tuberous rooted plants succeed well, as do hardy annuals, where they can receive a good amount of sun and air; also half-hardy annuals, such as stocks, asters and others, as well as various summer bedding plants to be hereafter noted. Amongst more permanent plants, though violets fail, Lily of the Valley grows excellently, as do the showy Aldborough anemones (see plate), which may be raised from seeds sown in drills six inches apart and an inch deep, in May, or as soon as new seed can be obtained, where the plants can grow and flower. Irises in brilliant variety rarely fail, nor do carnations, pinks, pansies, violas, polyanthuscs, various campanulas, pyrethrums, early chrysanthemums, helianthuscs, Michaelmas daisies, phloxes, and evening primroses, under sound cultural treatment.

Selections of plants and flowers for various purposes and positions will be given as this work proceeds.

SUBURBAN GARDENS.

Half-acre plots are about the average space allowed for the majority of suburban residences, and with these far more can be done than may appear at first sight—in fact, some of the most interesting gardens in the country are comprised in this category. One-half of that space would almost necessarily be given up to the growth of fruit and vegetables, and the other half, or thereabouts, be set apart for the dwelling-house and other buildings, lawn and flower garden. It sometimes happens that those who plan out these sites set back the house for the purpose of affording a short drive to the front door, but this is in many cases a doubtful advantage. A drive, however short, makes a material reduction in the quarter of an acre that is available for pleasure grounds.

Locating the house and outbuildings in the centre of the plot is an error that ought, where possible, to be avoided. Naturally it affords the architect better scope, while the owner does not often realise the effects of it till it is too late to remedy the error. A good clear space is needed for the kitchen garden and frame ground, and also for the pleasure grounds. What can the landscape gardener do with less than a quarter of acre when this is broken up into small plots surrounding a dwelling-house? It is true lawns may merge into the kitchen garden, but if pleasure grounds are to be thoroughly enjoyable there ought to be a certain amount of privacy connected with them. There is no good reason why the house should not be in the form of a parallelogram rather than a square, and be located wholly in the pleasure-ground quarter of an acre as is shown in the design on page 47. If necessary, a drive could be formed to reach a side entrance; this also serving as an approach to the back of the house, stables, and gardens. The house, in any case, should be set well back, say from 20 feet to 30 feet from the road, and if a suitable pavement is laid down and a porch formed, there need be no great difficulty in reaching a carriage clean and dry in all weathers and in the lightest of costumes. A glass-covered arcade, festooned with roses and other hardy plants, makes a beautiful approach. A low stone or brick wall, surmounted by an unclimbable iron fence, the whole standing 5 feet clear of the ground, ought to enclose that portion of the pleasure grounds abutting on a high road, a strong holly or other evergreen hedge usually proving sufficient for less exposed boundaries. A hedge of *Cupressus Lawsoniana*, *Thuia gigantea*, holly, or tree-box should also be planted inside the railing-surmounted wall, and kept at a height that will not unduly shade a border just inside.

When it comes to laying out the interior some regard must naturally be paid to the tastes and preferences of the owner. If miniature ponds, fountains, and several vases are thought desirable, by all means have them, but they are doubtful adjuncts, and more often than not disfigure rather than adorn a small garden. What may well be arranged for is a good-sized plant-house, or a greenhouse and vinery combined. That shown in the design is three-quarter span-roofed, 36 feet long and 14 feet wide. The front staging is 30 inches wide, the walk 3 feet wide, and the back staging occupies a width of $8\frac{1}{2}$ feet, stepped, that is to say, in three tiers. In front of this house there is a raised border 6 feet wide, and enclosed by either a brick or stone wall or a grassy slope. The border supports the vines which are planted in it, and taken through holes in the front wall, and trained up the roof. There is a doorway or folding glass door leading into the house, and another facing the walk passing the end of this house. In some cases a more ornamental conservatory is constructed in a prominent position, but such erections are rather expensive luxuries, as they necessitate the provision of more houses, in the kitchen garden probably, for the purpose of growing plants for the conservatory with a view to keeping it in an attractive state. Of this and the treatment of conservatory plants generally much more will be said in other chapters.

When the house stands, as it ought to do, well above the level of the surrounding ground, a terrace or raised walk following its outline, with a grassy slope to the rest of the lawn, is an attractive feature, and affords good opportunities for showing everything to the best advantage. Let this raised walk and terrace be made very solid, with a variety of material, such as stones, broken bricks, gravelly or clayey soil; but avoid using tree roots, or anything of a perishable nature, or the time will come when there will be inequalities and sinkages to contend with. A continuous border at the foot of the walls of the house will answer the double purpose of supporting a variety of climbers planted in it, and also for the reception of many beautiful flowering plants—bulbous-rooted and otherwise. This border may be 2 feet or rather more in width, and there ought to be a depth of fully 18 inches of good loamy soil. Next to this should run a good gravelled walk not less than 4 feet wide, and if archways, clothed with roses, clematises, honeysuckles, jasmines, and, in shady places, ivy, are formed, they will add greatly to the effect. On the same level another width of not less than 7 feet should be allowed for, this to be grassed over, a slope leading down into the rest of the lawn. A few standard roses would not be out of place on this grassed part of the

REFERENCES TO PLAN.

- 1 1 1. Outline of House.
- 2.2. Stages in Vinery and Plant House.
- 3.3. Entrances to Conservatory from House and Lawn.
4. Vine Border.
5. Walk.
6. Grass-covered Terrace, with Standard Roses.
7. Rockeries.
8. Grass Edging.
9. Flower Borders.
10. Raised Flower Bed.
11. Carnation Bed.
12. Herbaceous Border.
13. Fernery.
14. Rosery.
15. Summer House.
16. Seat under Tulip Tree.
17. Flower Bed.
18. Yucca.
19. Cupressus Lawsoniana.
20. Cedrus Deodara.
21. Pampas Grass.
22. London Plane.
23. Thujaopsis borealis.
24. Rho.tolendrons.
25. Evergreen Hedge, with ornamental outside fence.
26. Lawn.
27. Porch Entrance to House.

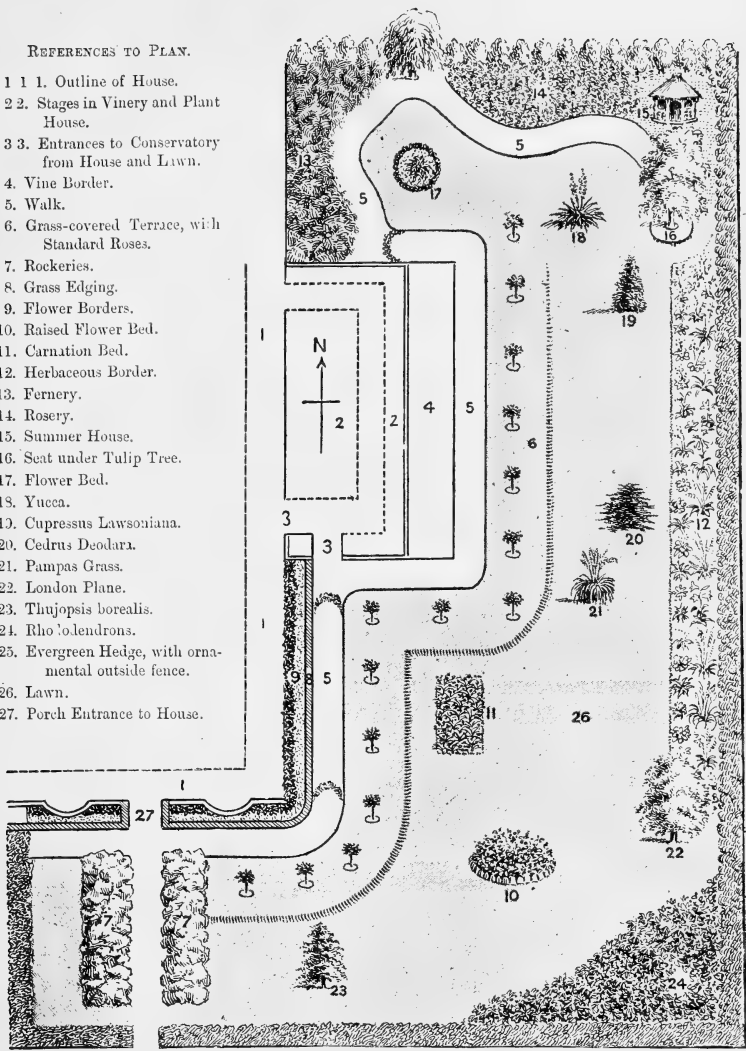


Fig. 27. PLAN OF SUBURBAN GARDEN.

Scale $\frac{3}{4}$ -inch = 12 feet.

terrace, but on no account break it up into a series of small flower-beds. Instead of formal designs or geometrically arranged groups of beds in prominent positions in small gardens, it is better to have a few plain moderate-sized beds in different parts of the grounds. In this way their interest is sustained, and more features of beauty provided, with a greater variety of plants at a lesser cost than is the case where the beds are grouped.

A good expanse of well-kept lawn is one of the most enjoyable adjuncts of suburban homes, and ought, whenever possible, to be provided. Smooth lawns materially enhance the beauty of flowers and trees. Instead, however, of dotting trees and shrubs indiscriminately, be content with fewer of these on the lawn, and have more outside borders and small shrubberies, letting the walks wind in and out among them. Very few forest trees should be tolerated in a small enclosure, as these greatly interfere with flower culture and choice evergreens. Appropriate positions may possibly be found for one or two trees for affording grateful shade in summer, and horse-chestnuts, beeches, limes, and plane-trees afford a good choice. Weeping trees, again, are effective, the specimen at the top of the design (page 47) giving an idea as to a suitable position for one of these. A rustic summer-house with the oak pillars clothed with roses, honeysuckles, and clematis, would not be out of place in the position assigned on the page cited, and, more often than not, would be fully appreciated.

A long border for hardy flowers ought particularly to be included, as a choice selection of plants grown in it would afford a welcome supply of sprays for cutting, and these borders are also worthy of inspection during many months in the year. In the design on page 47, the border is upwards of 60 feet long by 6 feet wide, and this is a size not by any means excessive. A cool shady place should be set apart for a fernery, rough rock work, stumps of trees, large clinkers and such-like material, all serving to raise and otherwise set off and benefit the ferns. Nor ought roses to be neglected, but a good-sized, well-prepared bed should be set apart for their culture in quantity. Rhododendrons are even more showy, and many of the hybrids are very beautiful. These will thrive in loamy soil if there is no lime present, but if common peat can be had, this should be freely used for rhododendrons, hardy azaleas, heaths, and plants of a like nature. A few conifers, notably such handsome species as *Cupressus Lawsoniana*, *Thuopsis borealis*, and *retinosporas*, may be pleasingly displayed on lawns; while yuccas, pampas grass, and bamboos are also ornamental in appropriate positions.

Raised beds are effective and easily constructed, especially if large enough to admit

of their being planted boldly. That shown (10) in the design (page 47) is nearly 10 feet in diameter, and is raised about 12 inches above the level of the lawn. In order to be durable straight lengths of barked oak branches should be used, driving these into the ground very firmly and closely together, leaning them outwards and affording a depth of not less than 12 inches for soil. A top rail, made by splitting circular branches and nailing them flat side downwards to the stakes, strengthens as well as adds to the appearance of the supports. If circular branches cannot be had the stakes must be squared neatly at the top and braced together by means of hoop iron taken round inside and nailed to them. Should hazel, spruce, larch, or other stakes be substituted, the lower part ought to be either charred or soaked in boiling tar or creosote. The weak place is near the ground level or just where the stakes feel the effects of both air and water. If the bed is made in the form of an octagon, there will be no difficulty about the connecting top rail. Sometimes these raised beds have a wire trellising to represent a handle put over them, and when this is covered with ivy (page 41), more of this also trailing over the sides, the basket is ornamental at all times. Vases may also be introduced in appropriate positions, as shown in the town garden on page 43.

Rockeries for alpine and other suitable plants might, with advantage, be formed in more small gardens than contain them at present. There are numbers of sparkling gems that can be grown in these positions with so little trouble that when once a love for this class of plants is engendered it soon communicates itself to visitors. All that is needed at the outset is a solid bank of medium-sized to small stones, with perhaps a few roots or stumps of trees interspersed, fixed informally over this. Where no vines are grown in the greenhouse a rockery could be arranged in front of it (5 in the plan, page 47), and this position answers well for alpine plants; there are also two rockeries (7 7), one on each side of the pathway, 18 feet long by 6 wide, and about 18 inches high in the centre of the ridge. Selections of species and varieties of rock plants and ferns will be duly forthcoming, as well as various cultural hints. Climbers have been incidentally alluded to. These should never be starved at the roots. Sunny house fronts may be greatly beautified, and the cooler, shadier ones in a lesser degree, without any great cost—always provided good judgment is exercised in the selection, and planting in a thoroughly well-made border.

Much of what is to be done ought always to be decided before the commencement of operations in forming a new garden. A well-thought-out plan simplifies matters considerably, but additions and improvements are usually possible later on.

Alterations may even be thought desirable after the walks, borders, and principal beds are staked out, and it is better to make them then than after the planting has been done and the grounds put into good order. Reserve much of the best soil wheeled away from the walks for the flower beds and borders, and note what has been said in the preceding chapter as to the unwisdom of burying good soil during the process of levelling (pages 39-40).

The question of drainage will have to be considered, as it is certain that badly drained ground must end in disappointment, for it is impossible that trees and shrubs can thrive in waterlogged soil. In any drainage scheme the first consideration is the outlet and position of the main drain in connection with it. If possible, let the latter pass along the lower end, and to this connect other drains 3 feet deep or thereabouts, and from 15 to 20 feet apart. For the main drain use 5-inch or even 6-inch pipes, the same class of pipes, 3 inches in diameter, answering for the remainder. See that the bottom of the trenches is made perfectly firm and smooth, with a gradual fall for the pipes, which must be covered either with inverted sods or rough stones to a depth of 6 inches. Return the soil evenly to the trenches, ram it down firmly to a little above the level to allow for further sinkage. One drain should always run in close proximity to the foot of a slope or terrace, as it is there where water usually collects. Also keep the pipes clear of forest-tree roots, as they are liable to choke a drain very quickly. Deep drains, however, are of little service unless the ground is thoroughly broken up to a depth of not less than 18 inches, and in order to derive the full benefit of the drainage, double dig or bastard trench the whole other than the walks and terraces.

Bastard trenching consists in breaking up the ground two spits deep without changing the positions of the soil. Commence by marking out a breadth of ground 30 inches wide, removing the top spit and "shovellings," or good loose soil, wheeling to where the last trench will be cut, as it will then be convenient for finishing the work. Then break up the bottom spit with either a fork or a mattock, and on this dispose the top soil from the next 30-inch width, breaking up the bottom of the second trench, and so on till the work is completed. Not till the tradesmen are well away from a house ought much of this work to be done, excessive trampling in wet weather soon making the ground as impervious to warmth and air as it was prior to trenching. In but few cases is the soil of a new pleasure ground sufficiently rich to grow herbaceous plants, roses, and various other flowers, and the borders may well, therefore, be treated much

as advised in the case of town gardens, while remarks on planting will be found in the chapter which follows.

COUNTRY GARDENS.

No two country gardens are alike, nor is it desirable that they should be. The arrangements and designs ought always to be largely governed by (1) the surroundings, (2) the natural conformation of the ground, and (3) the wishes of the proprietor. In many instances proprietors do not take nearly enough interest in their gardens and pleasure-grounds at the outset, their thoughts being concentrated on the house that has been built, and which may only await the finishing touches at the hands of decorators and furnishers. Not till it is too late is the fact realised that the gardens have been laid out in a very unsatisfactory manner, by the person who has done the work studying how to use as many trees and shrubs as possible. It does not follow that there are no capable and honest men in the profession, but, on the contrary, there are many clever gardeners who can be trusted to do what is right, and reference is made to this matter with a view to advising owners of new residences to look well after their own interests, while yet there is a chance of avoiding costly mistakes.

No such important work as forming and furnishing gardens should be done by any loose, haphazard, "out of the head" methods; or, in other words, according to ideas that may occur as operations proceed. To be satisfactory the work must be systematic. First let a careful survey of the ground be made, plans prepared, and estimates obtained; and not until these have undergone scrutinizing examination should they be accepted. Contract work comes much the cheaper, and because it is contracted for is no reason why it should be scamped, nor would it be by a landscape gardener or a nurseryman of good repute. Many nurserymen keep specially-trained men for preparing plans, also for superintending the laying out and planting of gardens.

A country house of a description that requires a good-sized kitchen garden, orchard, and pleasure-ground should stand well back from a road, and must, therefore, be approached by a drive. Whether this shall have a sweep through the grounds, the carriages going in at one gate and out at another or not, must depend upon circumstances. It is a question of convenience in accord with local arrangements. Then it must be remembered that a drive through a small, or even a medium-sized lawn, seriously limits its extent, and it should also be borne in mind that the work

of constructing coach roads is expensive. In the design given on page 54 the drive terminates at the front door in a circle about 30 feet in diameter. This allows room for a coach and four to turn if necessary, 11 feet being the width of the remainder of this road. No lodge is provided at the gate for the simple reason that less than half an acre is devoted to the pleasure-grounds. The same design, however, might be adopted for a larger area and a lodge included.

Once more let it be pointed out how unwise it is to occupy the best positions of lawns with a fancifully-designed "geometrical flower garden." This is usually a disfigurement, as are also a number of obtrusive, and often needless, intersecting paths. The charm of a lawn consists in its smooth central expanse, with broad sweeps gracefully winding between well-placed groups of shrubs, and wisely-planted trees. A few plain flower beds near the outskirts, and these effectively planted, give all the colour that is needed. A limited number of handsome conifers, judiciously disposed, bold clumps of Pampas grass, elegant cut-leaved Japanese maples, groups of yuccas, beds of roses, a mass of *Anemone japonica alba*, and perhaps a mulberry and a weeping tree, if there is ample room, are all suitable for lawns. In planting always keep in mind the dimensions to which the trees will attain, and avoid overcrowding.

Instead of running a gravelled walk through or near the centre of a lawn, arrange for it to wind round nearer the outsides (see 18 in plan, page 54), passing in some places under shady trees, in others near beds or borders of flowers, rockeries, ferneries, and, if they are afforded, water scenes. Where the grounds are less formal in outline, or of an undulating character, opportunities will be provided for carrying walks through shrubberies, as well as on the lawn side of them, so that an object of interest, such as a church-tower, monument, or other landmark, may be brought into view. Arrange shrubberies or belts so as to shut out the view of the house, this coming into the line of observation again at other points. When all the features of ornamental gardens or pleasure-grounds are seen at a glance, there is practically only one feature and that is sameness. Instead of this there must be diversity—variety—something to arrest attention, and afford pleasure at every turn.

If lovely scenery abound in the neighbourhood take care not to obscure it by planting, but strive rather to take in some of the best of it. Cutting avenues out of existing trees may bring some object of beauty or interest within the line of vision; or planting new avenues may concentrate attention on something that may be worthy of being brought into bold relief. If a raised walk or high mound can be intro-

duced, from which a fuller view of certain charming prospects may be obtained, there should be no hesitation in providing those elevations. Should a terrace be constructed, this need not necessarily, or in many cases advisedly, consist principally of bricks and mortar or stones, with a series of vases to match, imparting an air of stiffness and artificiality that might well be avoided. In some instances, retaining walls are necessary, but even these may be effectively covered with ivy, roses, and other trailing plants and climbers. Not infrequently these expensive walls are dispensed with altogether, steep grass slopes (page 59) with a series of wide stone steps leading to level ground—an arrangement which proves cool and inviting during the hottest times in the year. Costly vases, urns and high-class statuary, disposed in various parts of pleasure-grounds, are features to be valued, but they should not have very open positions, the statuary in particular being most effective when there is a background of foliage. This is even more imperative in the case of summer-houses. For these a sheltered and shady position is highly desirable, those much varnished structures too often seen in prominent positions rarely serving the purpose for which they were intended—namely, as cool resting-places or resorts during summer weather.

A lawn tennis ground is frequently the best-patronised part of a pleasure-ground. If there are members of the family who are fond of tennis, or are likely to be, the requisite space, or not less than 76 feet by 36 feet, should be set apart (page 54) and duly levelled at the outset, thereby avoiding a costly disarrangement of the garden later on. How to form tennis grounds suitable for use in nearly all weathers will be duly set forth under the heading of "Lawns and Grass Plots." Forest trees ought not to overhang a tennis ground, as they are apt to spoil the turf, but if a spreading tree is growing conveniently near, its shade is fully appreciated by the players and onlookers when the sun is powerful.

In the design (Fig. 28, next page) it will be seen that the popularity of the rose is not lost sight of, a bed on the lawn, also a sheltered corner, being set apart for its cultivation. Where the pleasure grounds are more extensive a rosery proper is usually formed, and a series of beds filled with dwarfs and standards in variety. Much as there may be to see and admire in a rosery during the summer, the bushes present by no means an ornamental appearance after the flowering period is past, and for that reason it ought not to be formed in a very conspicuous position, if it can be avoided. On this important part of our subject more has to be said in succeeding chapters.

Hardy herbaceous plants have greatly increased in popularity during recent years,

and are largely superseding the more tender summer bedding plants in gardens. Only comparatively few of the former are suitable for filling beds in conspicuous

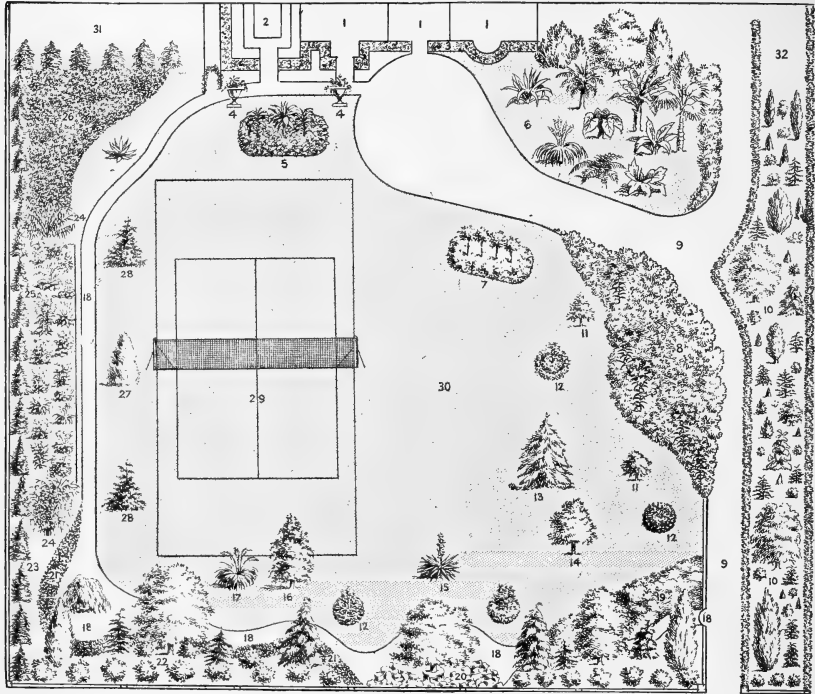


Fig. 28. PLAN OF COUNTRY GARDEN.
Scale $\frac{1}{2}$ -inch = 12 feet.

References to Plan.—1 1 1, Front of Residence; 2, Conservatory; 3, Flower Border; 4 4, Vases; 5, Bed of Begonias and Dracenas; 6, Group of Sub-tropical Plants; 7, Dwarf and Standard Roses; 8, Rhododendrons and Liliun auratum; 9 9, Drive; 10 10, Shrubbery with margin of Mahonia aquifolia; 11 11, Japanese Maples; 12 12 12, Flower Beds; 13, Wellingtonia gigantea; 14, Mulberry Tree; 15, Yucca gloriosa; 16, Salisburia adiantifolia; 17, Pampas Grass; 18 18 18, Walk; 19, Belgian Azaleas; 20, Hardy Fernery; 21 21, Margin of Ivy; 22, Shrubbery; 23, Hedge of Cupressus Lawsoniana; 24 24, Bambusas; 25, Herbaceous Border; 26, Bank of Roses; 27, Retinospora plumosa aurea; 28 28, Thuiopsis dolabrata; 29, Tennis Ground; 30, Lawn; 31, Orchard; 32, Kitchen Garden.

positions on lawns, and their proper place is in wide borders with, perhaps, a background of conifers or tall-growing shrubs. As will be hereafter shown, herbaceous plants, as a rule, succeed the best, and flower the most effectively, under liberal treatment

at the roots—hence the wisdom of selecting an open position, clear of forest trees, for them. Stake out the border in good time with a view to increasing the depth of fertile soil, not only by trenching, but also by the addition of a portion of the best of the top soil removed when the paths and drives are formed.

Rockeries are also very desirable, and afford great scope for the exercise of taste and ingenuity in designing and planting. Some may be formed in sunny positions and principally filled with dwarf flowering plants, while others may be constructed under the shade of trees, and planted chiefly with ferns, for producing elegant fronds in summer, while hardy bulbs inserted between them in the autumn afford brightness in spring. Then some positions offer good openings for the construction of suitable sites for aquatics, and bog plants, many of which are both uncommon and beautiful; but avoid stagnant pools, as these are offensive in pleasure-grounds. What is wanted is a stream of clear running water, which can be diverted and made to pass through some portion of the grounds, then cascades, waterfalls, pools, and ponds can be formed at will, many interesting features being added accordingly. It is in shady nooks and hollows through which clear streams flow that British ferns, arundos, bambusas, eulalias, gyneriums, and other suitable plants can be effectively arranged, and in the summer these cool resorts are delightful.

Those persons who have, or can obtain, a good stock of the hardier Palms, dracænas, musas, and other sub-tropical plants, can arrange some of them very attractively in the shade of rather tall forest trees, the stems of which add to the imposing appearance of the groups. A few well-grown plants plunged in the turf are picturesque, and more of this style of summer decoration will probably be seen in the future. Those who have no ideas of their own on the matter should make a point of visiting Battersea, Hyde, and other London parks, and take note of the way in which many nooks and beds are beautified by sub-tropical plants during the summer months. When the plants are removed in the autumn, instead of filling up the holes previously occupied by pots, let a selection of ornamental hardy evergreens, also in pots, take their place—elegant conifers in variety, yuccas, and, in the more southern counties, the green and variegated forms of New Zealand flax (*Phormium tenax*). Something of this kind is especially desirable when the sub-tropical plants are grouped in such a prominent position as that assigned them in the design.

Shrubberies, well arranged and planted, are of the most permanently ornamental character, and, for that reason, ought always to be regarded as of primary importance

by those responsible for the furnishing of a garden. More than ordinary pains should be taken with the preparation of the soil. Mere digging is not enough. It ought to be trenched, but not to the extent of bringing a quantity of clayey subsoil to the surface. Fuller advice on this matter will be found in the preceding pages. If the soil can be brought into a finely divided, free-working, state by the end of August, and is also moist, the planting of choice shrubs and conifers may be proceeded with whenever the weather is propitious, ceasing when frosty weather sets in or cutting winds prevail, recommencing in March and April. Deciduous trees may be moved from the middle of October till late in March. Those planted early will form some fresh roots before the winter arrives, while shrubs move readily just when both top and root growth is commencing in the spring. Evergreens, including aucubas, laurels, rhododendrons, and conifers, may be moved at almost any time of the year—provided extra pains are taken with them both as regards the transplanting, the condition of the soil, and judicious watering as may be needed.

Avoid planting when the ground is either very dry or in a saturated state. Much depends upon the condition of the roots of trees or shrubs when moved. If they have been transplanted not long previously no great difficulty will be experienced in securing a sufficient mass of adhering soil to keep them alive till fresh roots form and obtain food from the new position. The best results attend the planting of young trees and shrubs, or those not heavier, when lifted, than one man can carry. For immediate effect, good-sized specimens are desirable, and these can always be had by those prepared to pay for them. Many large trees experience such a severe check in removal that some of them die, while others are extremely slow in recovering. As a consequence they remain almost stationary, whereas the smaller scarcely feel the check and rapidly overtake those that do. The larger specimens also require much attention after they are planted. Should a dry summer follow, thorough soakings of water have to be given to the roots, also the tops must be syringed frequently or many of the trees will die and the rest become stunted in growth. Late-planted small trees and shrubs may also need copious supplies of water during a dry, hot summer, and in every case they should be given before the old balls of soil become dry, or the labour may be wasted. Mere dribbles are worse than useless. If the soil fail to rapidly absorb water when applied, remove a little of the topmost, and carefully loosen well down to the roots; then, if a basin is formed with soil, the water given will be conducted exactly where it is needed, instead of running uselessly away. A

mulching (covering) of strawy manure, half-decayed leaves, spent tan, cocoa-nut fibre refuse, or even fine dry soil applied after a heavy rainfall or a soaking of water, will, by arresting evaporation, prove of great benefit to large and small trees alike.

Most shrubberies are planted somewhat thickly at first for immediate effect, the intention being to thin out freely before the shrubs spoil each other. If this thinning out were done according to original intentions there would be far more perfect shrubberies to be met with than at present. In too many instances the thinning is either neglected altogether or carried out in a half-hearted manner; as a consequence, nothing short of a very free use of the knife or pruning shears prevents the commoner species overgrowing the choicer and less vigorous kinds, and a reign of general confusion setting in. It is often difficult to know which to remove and which to leave, but, if properly arranged in the first place, there need be no hesitation about the matter of thinning. Those which are to be permanent ought to be first planted in sites intended for them, marked by tall stakes, smaller stakes denoting where trees or shrubs (which may be of cheaper kinds) are to be temporarily planted. The proper space, or about what a well-grown tree or shrub would eventually occupy, should be allotted each that is intended to be permanent, and if their exact positions were marked on a plan, the thinning would be greatly simplified. Conifers, in particular, ought to have ample room, the stronger growers frequently attaining to a diameter of 20 feet, those of the *Cupressus Lawsoniana* type rather less, retinosporas and other Japanese species requiring the least room. When common laurels, aucubas, hollies, golden elders, privet, and inexpensive kinds are planted as supernumeraries, as they may well be, these can either be gradually cut away (as the permanent kinds require more room) or transplanted elsewhere. The sites for deciduous trees, flowering or otherwise, to be grown as standards dotted among the shrubs, should also be specially marked by tall stakes well driven down, these remaining, and the trees secured to them.

In some gardens a rather pleasing feature is made by trimming shrubs, more or less, so that they do not intermingle. They may then form an effective background to roses, stocks and other sweet flowers, as in the enjoyable old-time garden of Mr. H. V. Machin, J.P., Gateford Hill, Worksop, shown on the next page.

Deciduous trees and shrubs, which are naturally divested of their leaves when planted, have not infrequently very long young branches, while the roots have been,

of necessity, much reduced in the process of lifting the trees. All the strong branches of trees with few fibrous roots ought to be cut back more than half their length, only the naturally small and short growths being left their full length. The terminal buds of these will be the first to produce leaves; these early leaves incite root action, which, in turn, forces the buds on the much shorter cut-back stems into vigorous growth, thus laying the foundation of healthy trees. A good time for shorten-



FIG. 29. OLD-FASHIONED GARDEN (MR. H. V. MACHIN'S).

Shrubs, pillars and arches of climbing roses; bed of monthly roses; crescent of stocks and asters.

ing as directed is when the buds commence swelling in the spring. Many newly-planted trees die every year because their few roots could not furnish support to the disproportionate extent of branch growth. Cutting smoothly the broken ends of every root that is as thick as a quill with a sharp knife, from the underside upwards, slantingly, before planting, conduces materially to the emission of new fibres and free growth. Evergreens are seldom pruned when planting, beyond the removal of occasional coarse growths; and when subsequently pruned for reducing their size or

improving their form, the work should not be done till March, as if cut early fresh growths may form too soon and suffer from spring frosts.

Choice kinds disposed thinly, as advised, give the best results eventually, while close planting is the precursor of subsequent mutilation, and a reminder may be given that the spaces between newly-planted trees and shrubs can be occupied at the back with hollyhocks, delphiniums, sunflowers, and other tall-growing flowering plants, while a large variety of other hardy and half-hardy kinds, including bulbs, occupy the



Fig. 30. LILIUMS AND RHODODENDRONS AT NEWSTEAD ABBEY, NOTTS.

spaces between the front rows. Thus may the borders be rendered attractive in spring, summer, and autumn; but avoid overcrowding.

Rhododendrons should be among the permanently planted shrubs, where they succeed in the ordinary garden soil; but if there is much lime in it they will fail, therefore they sometimes have beds specially prepared for them. A mixture of common peat, leaf soil, and sharp sand suits them well; so also does it agree with *Lilium auratum*, of which fine spikes of bloom are shown in Fig. 30, springing up among the rhododendrons, brightening the beds at a time when they usually present a dull

appearance. The outer lines of rhododendrons may be allowed to spread out and over the turf, irregular lines adding to their general effect rather than otherwise.

Pinetum or Arboretum is the name given to collections of trees, those of the former consisting of conifers, the latter of other kinds as well, arranged in the pleasure-grounds. To lovers of trees these afford a considerable amount of satisfaction and instruction, though the majority of persons prefer choice trees and shrubs distributed about the grounds—not, however, pincushion fashion, or to spoil each other, but in positions where they have a deep and well-prepared rooting area, and also ample room to develop and display their individual characters to the best advantage. Allow, therefore, abundance of room for every tree or shrub, having to thin out a Pinetum being a decided mistake. Large, imperishable labels ought to be placed to the trees. These can be had to order, giving the native country of each tree as well as its botanical and popular name. This adds enormously to the interest of a collection, and the practice might well be more general, especially, perhaps, in public parks and gardens, which should be rendered instructive as well as ornamental.

Object lessons on the naming of trees and shrubs may be found in the Royal Gardens, Kew, as well as various other aspects of ornamental gardening. Tree and plant nomenclature also receive commendable attention in botanical gardens and some public parks (but by no means all) in different parts of the kingdom.

MAIN FEATURES IN GARDENS.

THOUGH some of the several features, which in various ways render gardens enjoyable, have been referred to, it is necessary to concentrate attention on those which are either indispensable or of such a distinct character as to be essential to the completeness of many gardens, large and small. It is not suggested that something of everything which may have been admired in certain enclosures should be represented in all, irrespective of their size, configuration or environments. Any such idea would be in conflict with the canons of good taste. What may be an object of beauty in one position may be an absurd incongruity in another. Beauty lurks in fitness, appropriateness, and the pleasing association of ideas as represented in gardens, as in dress or in architecture. Pretentious display in either conjures no pleasing thoughts and gives no intellectual satisfaction; it is neither attractive nor imposing, but repellent and garish. But while this should ever be kept in mind, it is not the less desirable that information should be imparted on the production of such features in gardens as walks and lawns, mounds and dells, rockeries and roseries, water scenes and sheltering screens, with such other adjuncts as are introduced with advantage and effect into many home surroundings.

WALKS AND DRIVES.

Much of the enjoyment connected with a private or public garden depends upon the arrangements of the walks and drives, and the way in which these are constructed. There should be no such thing as viewing all that is to be seen from one or two walks, but these and, in a lesser degree, the drives, ought to be made to wind in and out so as to bring into view different features at every turn. It is really astonishing what can be done in this way. What at the outset might be nothing more or less than a flat, uninteresting expanse of ground can, by the landscape gardener, be converted into a little paradise; and what the landscape gardener can do, not a few private gardeners are also equal to achieving.

There can be no fixed rules laid down as to what directions walks ought to take, or of the form they should assume. In some instances, or say when they are imme-

diately in front of a dwelling-house, they may well be taken along perfectly straight, turning off with an easy curve in any desired direction. When, however, it is a question of forming strictly pleasure paths through the grounds and shrubberies, then they ought to wind about, as shown in Fig. 31, so as to include the best views of various objects, such as castles, abbeys, mansions, churches and monuments, either in the distance or close at hand. The positions from which they can best be seen should be selected, and the walks lead up to and away from these. Water scenery is always attractive, and if the walks can be taken close to a pond, lake, or river at places, that will be an advantage. When good winding walks are provided—and these are also the best in every way when a steep bank has to be breasted—objects of interest, such as choice conifers, flowering trees, and shrubs, including groups of rhododendrons, isolated flower-beds, and beds of roses, can be established where they will be displayed to the best advantage. It is a great mistake to run a walk or walks right through the centre of a lawn, or to needlessly break up an expanse of turf in any such way.

In not a few cases where gravelled walks are formed, turf walks would have been more appropriate and more enjoyable. When the ground is well drained and the grass kept closely mown, they are little, if any, damper than gravelled walks, while they are much cooler and pleasanter in hot weather. The extra trouble of mowing is scarcely worth notice, and it must be borne in mind that gravelled walks require to be surfaced with fresh material every few years, also to be kept free from weeds, or they will be unsightly, and rolled, or they will be harsh to the feet.

The width of walks should be varied according to circumstances. Terrace walks and those along the fronts of houses are usually from 8 feet to 12 feet in width. The other important walks ought to be from 5 feet to 6 feet wide, while from 3 feet to 4 feet suffices for certain positions.

Drives or carriage-ways to a house have perforce to be formed primarily with a view to utility, but need not necessarily be straight and excessively formal. The approach may be perfectly straight, and this affords a good opportunity for laying the foundation of a noble avenue of trees; but once inside the pleasure-grounds then very straight cuts should be avoided, and bold sweeps and easy curves arranged as both convenient and agreeable. It is only in the case of long distances that drives need be made wide enough for conveyances to pass each other without getting off the track, but there ought always to be a good circle at the front door, in diameter

at least double that of the approach. Some idea of what is meant will be gathered from the illustration on page 54.

It is of the greatest importance that the gradients be made as easy as possible; this, in many instances, necessitating a considerable amount of levelling, excavating, or sinking the walks or roads in some places, and filling up in others. This work cannot be done satisfactorily without the use of levelling instruments, more especially boring-rods, a straight-edge, and spirit-level. Illustrations of these inexpensive appliances,



Fig. 31. CURVING WALK THROUGH PLEASURE GROUNDS.

with instructions how to use them, will be given in the chapter on Lawns and Grass Plots, and they will, therefore, be only briefly alluded to now. Commence by deciding what points shall be the highest ground level, and from these further levels may be sighted, or, if the ground necessitates it, there may be easy rises or falls from these points. Due regard must be paid to the imperative need for perfect drainage, and it is at the lowest points where, naturally enough, the water is most liable to collect. There should be no lower side to walks, or drives—they must be level,

or they will prove neither serviceable nor enjoyable to walk on or drive over. The edges ought to be first formed, and when these are completed or the whole outlined, the work of filling in with suitable material can be carried on rapidly without any waste. A peg having been driven into the ground, so as to bring the top of it exactly to the level decided upon as the highest point, get the level of the opposite side of the walk or drive by means of another peg, or with pegs if the width is considerable, by means of a straight-edge and spirit-level. If the walk or drive has to be made perfectly level, that plan may also be adopted throughout its entire length as well as width. In the case of falls from given points, then the pegs and borning-rods or enlarged T-squares will be the proper appliances to use. Drive in the pegs at the higher and lower points, and the proper height for intervening pegs can easily be had by sighting over the borning-rods resting perpendicularly on the end pegs and the one to be brought in a line with them. After a fairly large number of pegs have thus been driven in, a firm edge, say one foot in width, should be formed with moderately stiff, yet free-working, soil, ramming this down quite solid, leaving it at the level of the top of the pegs, after which the latter may be drawn, and used farther on. Then can follow the work of excavating and wheeling or carting away the good surface soil; also subsoil where necessary, using the latter for levelling, where much of it is required, taking care to ram it down very firmly.

For a road to be really serviceable, there must be a depth of from 12 inches to 15 inches of hard stone and other material used in its formation, and ample provision for good drainage afforded (Fig. 32). For walks subjected to heavy work there should be a depth of 9 inches allowed, 6 inches proving enough for light work (Fig. 33). At one time, a single drain under the centre was considered sufficient, but of late years the preference has rightly been given to the plan of laying an ordinary loose earthenware pipe drain along each side of a road, and not unfrequently of walks too, sinking these just below the level of the base formed with the subsoil. Give the bottom of the walk, therefore, a curved or slightly rounded form, just sufficient to throw the water to the sides. Burnt clay or ballast is excellent material for forming a lasting road foundation, and on from 6 inches to 8 inches of this distribute 7 inches of broken granite or blue ragstone, with a surfacing, 2 inches or rather less in thickness, of fine gravel or ground stone. Steam rollers give a good finish to these macadamised drives, but can only be used over a very solid foundation.

For the foundation of garden walks, brick ends, clinkers, ballast, flints, and stones

broken up coarsely, may be used, on this placing 2 inches of finer hard material, making all as solid as possible with rammers. There should be no high centres to either drives or walks, but only just enough curve allowed (see Figs. 32 and 33) to throw off the water to the sides. The centre of a drive or walk 8 feet to 12 feet in width may be from 1 inch to $1\frac{1}{2}$ inches above the edge level, adding $\frac{1}{2}$ inch for every additional 2 feet in width. The exact height is easily regulated by the use of a central line of pegs levelled as advised in the case of edge formation, and these pegs should not be drawn out till the time has arrived for surfacing over with binding gravel. Two inches or rather more of this is needed, and it requires to be levelled very carefully with the back of a rake, then closely trodden, again made even, and rolled till it is firm and smooth. Newly-made drives and walks should be frequently rolled, doing this at a time when the gravel will not be drawn up in the process.

Drains are necessary not merely for the purpose of keeping water from collecting on

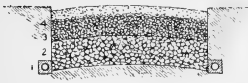


Fig. 32. SECTION OF ROAD.

1, Drainage pipes; 2, coarse stones; 3, smaller do.; 4, surfacing gravel.

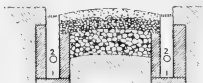


Fig. 33. SECTION OF WALK.

1, Gully; 2, drain pipe, stones and gravel as shown.



Fig. 34. LONGITUDINAL SECTION OF WALK.

1, Catch-pit; 2, drainage pipes leading into and out of gully.

the bottoms of walks and drives, but also serve to carry away the top-water when provision is made for collecting and transmitting the same to the drains underneath. The slight curve given to the centre will throw the water to the sides, and this ought further to be intercepted by gullies surmounted by iron gratings at intervals of from 20 feet to 40 feet apart, according to circumstances. In the case of somewhat steep ascents these gullies or small catch-pits have to be the most frequent, as otherwise great accumulations of water will quickly carry the gravel from the higher parts of the walks or drives to the lower ground. Sometimes grips or bars have to be formed obliquely across walks opposite to the gullies, these intercepting and preventing heavy rushes of water. They may be formed with a paved front of flat bricks with other bricks on edge to form a slightly higher back, or strong oak quartering may be substituted, the latter proving the more durable where there is heavy traffic. The gully-holes should be from 9 inches to 1 foot deeper than the drain pipes, the latter passing through the centre as shown in Fig. 34, the extra depth allowing space for mud to collect without

quickly blocking the drains. For walks they may be constructed 6 inches square, inside measurement, the grating either let into a strong oak or stone framework, the sides to be $4\frac{1}{2}$ -inch brickwork, resting on a flat stone base. For the drives the gully-holes ought to be from 15 inches to 18 inches square, and, as a rule, 3-inch drain pipes are not too large for drives and carrying away a rush of water, 2-inch pipes sufficing for the rest. Gratings must be kept free from leaves and gravel, and ought always to be movable in order that the gully-holes may be frequently emptied of mud that quickly collects in them in some positions. It only remains to be added that the invention of Mr. W. H. Sladdin, Brighouse, Yorks, is excellent for its purpose, and that neither this appliance nor the gratings need be actually sunk in the walks or drives, but should be flush with the edgings. (See Fig. 35.)

CLEANSING GRAVEL.

Gravelled surfaces cannot be satisfactory if infested with mosses or weeds. Hand-weeding is out of date, and salt has long since been found to make the gravel damp and rotten. Arsenical preparations, sold under the name of "Weed Killers," and applied as advised by their vendors, destroy all vegetation, also give walks and drives a cleaner, brighter appearance than formerly. Those who prefer to make their own weed-killers can do so, the following recipes

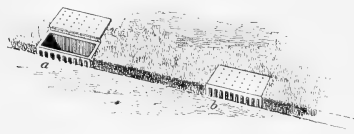


Fig. 35. SLADDIN'S GULLY TRAP.
a, open; b, closed.

extracted from the "Horticultural Directory" all answering well:—

"1. Mr. W. Sowerby, of the Royal Botanic Gardens, Regent's Park, reports that for killing vegetation, and preventing its growth on gravel walks, he found carbolic acid in very dilute portions (No. 5 quality in one hundred parts water) was the best, retaining its effect longer than any other.

"2. Dissolve 1 lb. of powdered arsenic in 3 gallons of cold water, stirring until it boils. Then add 7 gallons of cold water, and 2 lbs. crushed soda. Stir the whole well whilst boiling, and with a rose-watering pot apply to the walks in dry weather from March to May. An inclining board should be placed so as to keep the hot liquid from the grass or box edgings. The quantity is sufficient for twenty-five square yards.

"3. A saturated solution of carbolic acid sprinkled over the path from a common watering-can will effectually destroy the weeds, and also kill ants and other small

insects that may harbour there. If the walks have box or grass edgings great care must be taken in applying the solution, lest the edges suffer from its contact, as it has no particular respect for any sort of vegetation. One dose is sufficient for a season. It must be kept from coming into contact with either the hands or clothes, as in the former case it will cause the skin to peel off.

“4. Buy common vitriol, about 3d. per lb. Choose a clear evening, after a hot day. Put water into a wooden pail or tub, and add vitriol thereto in the proportion of one to thirty parts of water. Take a well-painted watering-pot, and, beginning at the end of the path, step backwards, watering as you go, taking care to keep clear of the edgings, if these are living, and to avoid splashing the mixture over clothes or boots. When done, fill the pail with fresh water, and leave the watering-pot in all night, to draw out the acid. In the morning the path will not injure boots after the dew is off, and the weeds will be either all dead or dying. Should one's clothes get a spot or two, a teaspoonful of smelling salts in water will restore the colour. Let the path remain for a day or two, and then brush off the dead weeds. One application is generally sufficient for a long time. Tried and proved for years.

“5. Get a little crude carbohc acid, which is cheap, and make a very dilute solution with water, about an ounce of the former to a gallon of the latter. Water the gravel very carefully with it. Do not let it touch the grass lawn or borders.”

ASPHALT AND CONCRETE WALKS.

Asphalt and concrete walks, though most serviceable and the least trouble after they are once made, are not, as a rule, approved for walks and drives in prominent positions. Unless particularly well made, the asphalt is liable to soften in hot weather, the smell of gas tar also being objectionable. Where, however, gravel is liable to be washed away, and in positions where there is much wheeling to be done, asphalt and concrete walks are desirable. Three good methods of forming these are as follows:—

“1. Take two parts dry lime and one part coal ashes, also very dry and both sifted fine. In a dry place on a dry day mix them, and leave a hole in the middle of the heap, as bricklayers do when making mortar. Into this pour boiling hot coal tar; mix, and when as stiff as mortar, put it down 3 inches thick to form the walk. The ground should be dry and beaten smooth. Sprinkle over it coarse sand; when cold pass a light roller over it, and in a few days the walk will be solid and waterproof.

“2. An old gravel path will only require to be swept clean; a newly-made one to

be well beaten and rolled. Choose a warm day (the warmer the better); let the tar be boiling hot; use the common, long-handled, iron-bound tar-brush and iron kettle, holding about a gallon, for the purpose of taking only so much tar from the boiler at one time as can be used in about a quarter of an hour, and paint over with a good coat. Let a lad follow with dry sifted sand, throwing over enough to prevent the tar sticking to his feet, and then go over with the roller. Two men tarring will employ a lad to follow with the sand, and another to attend to the fire and supply the tar as fast as it is used. This repeated every three years, the surface will become quite hard, and the paths will always be perfectly dry and pleasant to walk upon, even in the worst weather.

“3. Where good gravel or other material is scarce, garden paths may be formed by using gas-lime from the gasworks. A firm foundation must be formed, with what rough material may be obtainable, and made quite smooth and level. The gas-lime is then to be laid on 1 inch to $1\frac{1}{2}$ inches thick, highest in the middle of the path, to throw off the rain, then well rolled or beaten with the back of a spade. Over that is placed a thinner layer of fine coal ashes, or rather dust; this is well rolled, too, and the walk finished. The rain runs off, no wheelbarrow leaves a track on it, and no weeds or moss grow on it. The colour is a dark grey.”

Edgings to walks or drives are usually needed, and in suitable positions few answer better than grass verges. They ought to be laid firmly and evenly, also wide enough to admit of mowing with a machine. Where there is too much shade for grass to grow, then ivy will be found an excellent substitute. Both the small-leaved common kind, *Hedera helix*, and the familiar large-leaved Irish ivy, answer well if planted out of pots, and pegged down, so as to form a continuous line at once. In the course of a few years, a dense evergreen edging will be established, requiring only an occasional severe clipping to keep it fresh and within bounds. Woodland and shrubbery walks may also be bordered with *Mahonia aquifolia*, while some have rough rockery edgings, in which ferns, periwinkles (*vinca*s), and other appropriate plants are established.

LAWNS AND GRASS PLOTS.

British lawns are world-renowned. They are the pride of their owners, and the envy of the foreigner. Our American visitors are invariably impressed with the refreshing appearance of our closely-shaven, velvety turf, and attempts have been made to have some of it “sent over” for establishing in their pleasure grounds.

While it is fortunately possible to establish good turf in a short space of time, it may not be quite so dense as that of some of our century-old lawns; much, however, depends upon the way in which the ground is prepared at the outset.

DRAINING.

For a lawn to be enjoyable throughout the greater part of the year it must be well-drained. Not only do "sloppy" places spoil lawns for use, but an excess of water kills the finer grasses, and favours the spread of those of a coarser nature.

Whether or not land requires to be drained can easily be ascertained by digging holes in the winter or spring, 3 feet deep, and boarding them over. If the water accumulates and stands in the pits for many days together, to a depth of a foot or thereabouts, drains are needed to keep the ground sufficiently dry to suit the best grasses, and render the lawn fit for constant use. Very shallow drains are apt to prove injurious, and in dry seasons their course can easily be traced by the withering of the grass over them. Ordinary pipe drains suffice in most cases at distances of 12 feet to 18 feet apart, and from 2 feet to 3 feet deep, with a gentle fall and good outlet. In heavy soils of a clayey nature the drains may be closer, and about 2 feet deep; also, to make them effective for a great length of time, the pipes should be covered with clinkers, brick ends, stones, or ballast to a depth of nine inches. Especially is this desirable in the case of tennis courts and cricket grounds, so that they may be quickly available for use after heavy rains.

A lawn must be free from surface inequalities, the result of faulty levelling, or the grass cannot be closely mown, and the lawn kept in a satisfactory state. Too often a start is made with inferior turf, abounding in coarse weeds, whereas by sowing seeds a more perfect lawn may be had in a comparatively short space of time at one-sixth of the expense of laying turves, if these have to be purchased. Before taking these separate points in detail, a few hints on the levelling of different sites will be given.

LEVELLING.

When ground has to be prepared, and lawns formed on an extensive scale, the work ought to be entrusted to experts, but levelling and laying out smaller pleasure-grounds has been frequently well done by men not having had much previous experience, and with the aid of simple appliances only. For extensive operations what is known as a theodolite is required. This instrument has a tripod stand, supporting an adjustable telescope and a spirit level, and is of the greatest service in finding levels at a con-

siderable distance from where it is fixed, enabling those using it to ascertain the rise and fall of the ground. Excellent substitutes for this instrument, and more easily understood, are an ordinary straight-edge, spirit-level, and borning-rods. The first-named may be of white deal, or other wood not given to warp, 8 feet in length, 5 inches deep, and not less than 1 inch thick, with the edges perfectly square. The borning-rods (Fig. 36) are usually about 4 feet long, and used for levelling irregular slopes. As a rule, the levels are taken from the house, when this overlooks a lawn.

During the process of levelling and forming lawns, there is always the risk of burying much of the best surface soil, and baring that of a poorer character. A very rich, deep soil is undesirable, as promoting a rank growth of grass; but if the other extreme is reached, a good sward will never be had. In the process of levelling, every barrow-load of surface soil should be saved, filling up inequalities with the poor subsoil. All bared spaces ought to be broken up deeply with a fork or spade, and have good soil spread over them to a depth of 6 to 9 inches. Light, dry soils may be improved by the addition of clayey loam, and very retentive ground should have light soil mixed with it. All must be made firm, and the greater the depth of moved soil the more need for extra care in solidifying it. The rammers must be kept going as each layer is added, surface patting being quite inadequate for compression.



Fig. 36. BORNING-ROD.

In the case of terraces, croquet lawns, tennis courts, cricket pitches, and bowling greens, a good supply of wooden pegs, in addition to the straight-edge and spirit-level, will be needed. First decide upon the level, driving in a peg to a depth for the top to correspond with it. From this other pegs may be inserted at 6 feet to 8 feet apart, determining the exact height at which to leave them by means of the straight-edge and spirit-level, the former resting on a peg that has already been adjusted, and another that is to be driven in. When the air in the tube of the spirit-level is exactly in the centre both pegs are on a plane, and in this way a whole series, or to the full length and width of a terrace or other ground, can be brought to one level. The next proceeding is to lower the soil in places where it is already higher than the pegs driven in, and to raise it to the tops of the pegs, where these protrude, bringing the surrounding space up to the same level, after which all the pegs may be drawn, and

turf laid or seeds sown. Bowling greens can be made slightly rounding by levelling with soil up to the top of the pegs, in a straight line through the centre, allowing a slight fall at the next row of pegs, or, say, from 1 inch to 2 inches, doubling that at the next row of pegs.

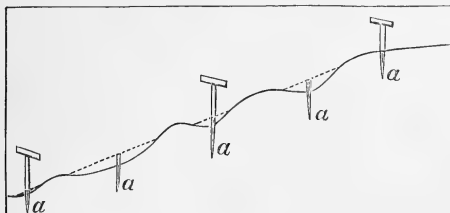


Fig. 37. LEVELLING.—OBTAINING UNIFORM SLOPE.
(See text.)

For levelling slopes (page 59) the depth at which the pegs are to be sunk can best be arrived at by means of boring-rods. Three of these are required, one placed on the pegs (*a*) at the highest, and the other at the lowest, point of the slope to be levelled (see

Fig. 37), determining the intermediate heights by sighting across the space. In long lengths the boring-rods can also be used for levelling between the pegs, previously fixed at the proper height. Irregular slopes require a certain amount of judgment expended on their levelling, or much labour may be wasted. A reference to Fig. 38 (from "The Gardener's Assistant") should be helpful in showing how to avoid costly mistakes. First find the mean levels of the upper and lower halves of a slope to be levelled, as *a b* and *c d*, and the difference of their heights, *a d* (4 feet). Half the difference marks the position of *h l*, or the mean level of the whole depth. Measure up 4 feet from *l* to *p*, and down from *h* to *i*. The line *i p* will correspond with a slope requiring the least amount of labour to reduce the irregular surface, shown by the curving line, to a gentle uniform slope. The rising ground, *a*, has only to be turned into the hollow at *b*, and that at *c* into the sunken space at *d*. If a steeper slope is desired, more soil will have to be moved from the lower projection to the highest point, reversing these conditions in the event of a more gentle fall than that shown in the diagram being preferred.

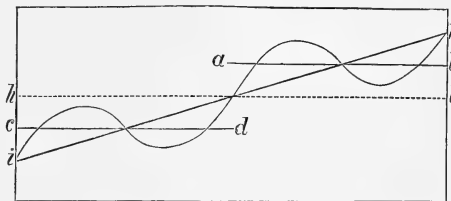


Fig. 38. OBTAINING LEVEL (*h l*) AND SLOPE (*i p*).
The curved line indicates the original irregular surface.

It is not merely where perfect levels and well-graduated slopes must be formed that levelling instruments should be used, but they are required for all parts of a

lawn, as slight inequalities prove an eyesore when the mowing machine does not, as it cannot, cut closely in the hollows. It does not follow that all lawns need be level, but, on the contrary, in certain positions rounded lawns are more appropriate and

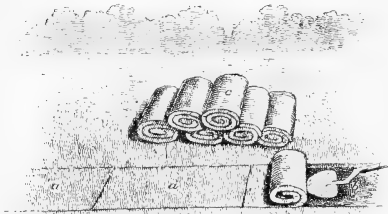


Fig. 39. RAISING TURVES.

a, turf ritted out; *b*, raising; *c*, turves rolled for transit.

equally pleasing; but they must be uniform or free from alternating lumps and depressions for the reasons stated. All surfaces must be made uniformly firm by ramming or treading, also smooth, by raking and rolling, and again lightly loosened prior to laying down turf or sowing seeds, or the results will be more or less disappointing.

TURFING.

Turf is preferred for covering slopes of all kinds, and is also necessary as a verge to walks, when the rest of the ground is to be sown, as it is next to impossible to make and keep a firm edge with soil alone. The turf verge, when properly laid, also indicates the height to which the soil beyond must be raised, joined, and levelled for sowing grass seeds. If turves of fine grass, free from coarse weeds and daisies, can be had excellent lawns may be established quickly; but rather than use coarse, weedy turf it is better to wait till a good sward can be formed by sowing seeds.

In order to be able to relay turf expeditiously and effectively, it must be first properly cut of uniform thickness. An ordinary spade is not suitable for this work, but a turf raiser (Fig. 39) is needed for use after lining and ritting out with the turf or edge cutter (Fig. 40, *d*). With these implements it is a compara-

tively easy matter to cut turves in 1-foot widths, 3 feet long, and $1\frac{1}{2}$ inches deep, one man using the raiser, and another rolling the turf from it as the work proceeds.

Turves are best laid in the autumn, or during mild weather in the winter, closely

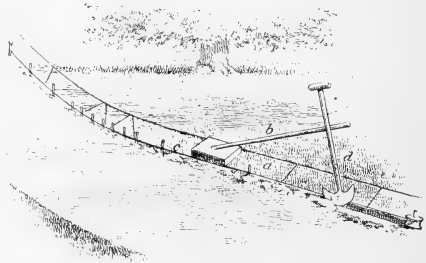


Fig. 40. LAYING TURF.

a, grass verge; *b*, beater; *c*, line and pegs; *d*, edge-cutter.

and neatly, making them perfectly level with the aid of a heavy beater, as shown in the illustration; when laid late in the spring shrinkage usually takes place directly dry weather sets in, and the cracks require to be filled with fine soil. An occasional heavy watering is also beneficial. What the turf beater fails to do in levelling must be accomplished with a heavy roller, and this may be frequently used when the roots of the grass have become established in the soil. Mowing ought not to commence very early, or the lawn be cut severely during the first summer; and if, in dry weather, the turf can be occasionally flooded with water, this will further tend to keep it fresh and green.

LAWNS FROM SEED.

As previously indicated, the best of lawns may be had by sowing seeds. They can be made to present a fresh, green appearance in a few weeks, but usually require a season's growth to become close and firm enough for tennis. The best time for sowing lawn seeds is during favourable weather towards the end of March and early in April, though August and the early part of September also answer well, if the ground is moist, not otherwise. By sowing too early in the spring, or too late in the autumn, the young grasses are liable to be injured by frost.

It is of the greatest importance that the soil be thoroughly cleared of the fleshy roots of perennial weeds, such as docks, dandelions, buttercups, and couch-grass, or these will grow, and prove very difficult to eradicate; indeed, the ground should be free from all kinds of weeds. As a rule the work of preparing the ground for lawns from seed is too much hurried. If after all the roots of such weeds as those mentioned are forked out, there is reason to suppose the soil contains a number of seeds of annual weeds, such as chickweed, groundsel, and particularly coarse grasses, it is best to let these germinate, then carefully hoe up the young plants and rake them off. It may be necessary to do this two or three times, to insure the ground absolutely clean before sowing the proper seeds for forming a close, fine, permanent lawn.

It is generally advisable to consult a seedsman of good repute as to the best mixture of seeds for sowing, stating the nature of the soil, position, uses, and extent of the intended lawn. It used to be the custom, and is too much so now, to include far too much perennial rye-grass seed in lawn mixtures—even to this equalling all the other, and much finer, grasses put together. The result of this is a great “show” of grass in a little time; but it is delusive, for the stronger grasses destroy the weaker,

and a coarse lawn is the inevitable result. Clover was, and is, also often too freely mixed with lawn seeds. If for special reasons it is desired in lawns, the seeds ought to be sown separately, for if mixed with the much lighter grass seeds, the heavier clover seeds naturally sink to the bottom of the bag, the portion of ground first sown receiving few of them, while the parts last sown receive ten times too many. We give an example of an ancient lawn mixture which is still too largely used where fine lawns are expected :—

Agrostis stolonifera	...	...	...	...	...	...	...	...	...	5 lbs.
Cynosurus cristatus (Crested Dogstail)	...	...	...	...	...	...	...	...	...	8 "
Festuca duriuscula (Fescue grass)	...	...	...	...	...	...	...	...	...	4 "
Festuca ovina (Sheep's Fescue)	...	...	...	...	...	...	...	...	...	3 "
Lolium perenne tenue (Perennial Rye-grass)	...	...	...	...	...	...	...	...	...	25 "
Poa nemoralis (Meadow Grass)	...	...	...	...	...	...	...	...	...	3 "
,, ,, sempervirens (Evergreen)	...	...	...	...	...	...	...	...	...	3 "
,, pratensis (Smooth-stalked Meadow Grass)	...	...	...	...	...	...	...	...	...	3 "
,, trivialis	...	...	...	...	...	...	...	...	...	3 "
Trifolium repens (Creeping Clover)	...	...	...	...	...	...	...	...	...	9 "
,, minus	...	...	...	...	...	...	...	...	...	3 "
Trisetum flavescens	...	...	...	...	...	...	...	...	...	1 "

70 "

For shady positions we are told to "omit *Festuca ovina* and *Trisetum flavescens*, and add an extra 2 lbs. each of *Poa nemoralis* and *P. n. sempervirens*. *Trifolium minus* and *Trisetum flavescens* are unsuitable for strong, rich soils, and for these substitute 3 lbs. of *Cynosurus cristatus*, and 1 lb. *Festuca duriuscula*. The *Trifoliums* holding moisture longer than grasses are not so well adapted for bowling greens, tennis courts, and cricket pitches; but there should be no reduction in the quantity of seeds sown, especially when the lawns are wanted quickly for use."

The conditional advice may be sound, and that relating to the *Trifoliums* (clover) certainly is; the mixture may suffice for parks and those parts of pleasure-grounds that are only kept in a semi-dressed condition; it is too coarse for a lawn of the first quality—close, soft, smooth and delightful—the result of sowing clean, sound seeds of the finest grasses in the cleanest possible soil.

After much experience in forming lawns from seed in the parks and gardens of London, as well as in various parts of the country, Mr. Barr, of King Street, Covent Garden, uses the following formulæ :—*a*, for lawns of the highest quality; *b*, when a cheaper mixture is desired: also one intermediate between the two.

<i>a</i> , FIRST QUALITY MIXTURE (no rye-grass):	<i>b</i> , THIRD QUALITY MIXTURE (with rye-grass):
Agrostis vulgaris 4 lbs.	Agrostis vulgaris 2 lbs.
Cynosurus cristatus 4 "	Festuca duriuscula 2 "
Festuca tenuifolia 4 "	" tenuifolia 2 "
Poa nemoralis 4 "	Poa nemoralis 2 "
" pratensis 4 "	" pratensis 2 "
20 "	Rye-grass, dwarf perennial 5 "
	15 "

The quantities given are for 1 rood ($\frac{1}{4}$ acre), so that of the first quality 80 lbs. per acre are required, when a lawn is desired quickly; while of the cheaper mixture con-

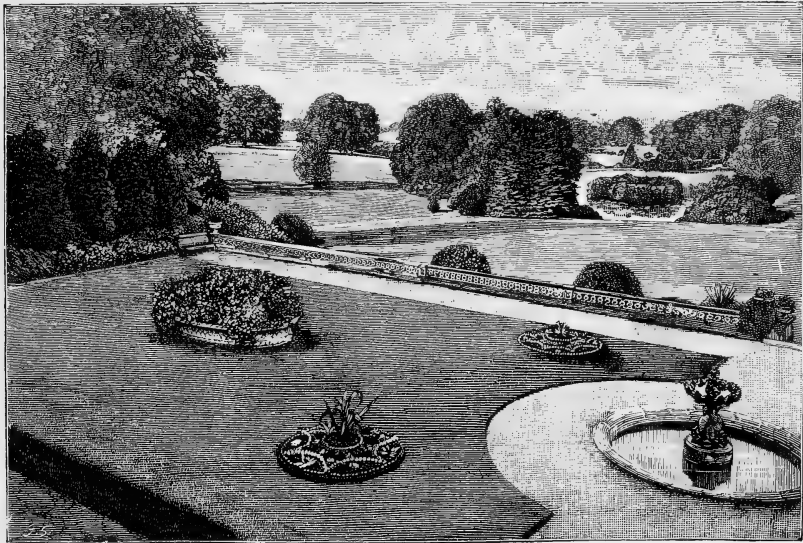


Fig. 41. WELL-KEPT LAWNS FROM TURF AND SEEDS.

The Terrace Lawn (level) from clean turves; the Pleasure Grounds (rounded) from best seeds.

taining rye-grass, 60 lbs. suffice. The second quality formula is intermediate between the two, quantity 70 lbs. per acre. Best quality lawns, like best quality seeds, though costing a little more at the outset are by far the most satisfactory in the end.

Not only ought grass seeds to be sown on a calm day during dull, showery weather, but the man responsible for their even distribution should keep his hand low, using first about half the quantity intended to be sown, following with the other portion directly across the first line. This should be immediately succeeded by a careful raking, covering

as many seeds as possible. In small plots sifted soil may be lightly scattered over them, a heavy rolling in both directions completing the fixing of the seeds, and leaving the surface quite smooth. Birds, especially sparrows and finches, must, if possible, be kept away, as they are liable to carry away the seeds. Strands of thread stretched a few inches above the ground have a deterrent effect; so has a mixture of dry sifted soil and petroleum, the soil not being made too damp for free spreading. It may be lightly scattered on at necessary intervals, as if sowing seed.

When seed has, perforce, to be sown during dry weather, the ground should be thoroughly moistened an hour or two *before* sowing, and gentle waterings every evening afterwards will be of great benefit. Seeds sown at a favourable time will require no such attention. Directly the grasses are long enough, they ought to be "switched over" with an extra sharp scythe, repeating the operation in the course of another week or ten days, and giving the ground a good rolling immediately after each cutting. When well established, not before, a clean-cutting mowing machine may be substituted for the scythe. Rolling, with close mowing, serves to keep down the coarser grasses that may abound, and to favour the growth of those of a finer or more desirable character. How attractive well-kept lawns are, whether level and formed of weedless and finely-grassed turves, or rounded, as established by sowing appropriate seeds, may be perceived on reference to the illustration on the preceding page.

IMPROVING OLD LAWNS.

Innumerable old lawns require renovation, and many of them might be easily improved by draining, levelling, seed sowing, and manuring. If water is very slow in draining away, the hollow places remaining in a saturated state for many days together, either there are no drains or those existing are no longer effective—they may be choked with tree roots or other obstructions, or the outlets blocked up. Such drawbacks to the enjoyment of a lawn should be speedily remedied. After lawns have been formed a few years, hollows frequently occur. If on a small scale the turf may be raised and rolled back as far as needed, but not wholly detached. After adding fresh soil and firming it to the proper level, unroll and return the strips to their original position, finishing with a heavy beating. Larger breadths ought to be wholly stripped of turf, relaying as advised after levelling the ground, subsequently treating similarly to newly-turved lawns. Where the soil is naturally damp a drier surface is obtained by laying the turves on a thin layer of sifted ashes.

Where the grass is very thin loosen the surface of the soil with iron rakes, and then sow seeds of the mixture recommended for new lawns, at the rate of a quarter to half-a-pound to 30 square yards. Cover very lightly with fine soil and roll heavily. If this is done in the autumn or early spring months a distinct improvement in the quality of the turf will be observable the following summer.

Mossy lawns are pleasant to walk upon at times, but are bad to cut, and the first to become brown in dry weather. The spread of moss is due either to bad drainage or poverty of the soil. If the drainage is defective remedy this, and the moss will gradually disappear. The best preventive of moss on poor soil is an occasional dressing of lawn manure at the rate recommended by the vendors; or soot may be applied during showery weather in the spring, at the rate of one peck or rather less to the square rod ($30\frac{1}{4}$ yards). Strong manures are liable to promote a coarser growth of grass than is desirable, and in many cases a dressing (following a sharp raking) of three-parts fine fresh loam, mixed with one part each of lime and wood ashes, spread to a depth of half an inch, would be attended with the best results.

In numerous instances turf has been spoilt by allowing the grass to grow to a length almost suitable for making into hay before mowing, thus favouring the growth of the coarser grasses at the expense of those of a finer nature. Early in the spring lawns ought to be well swept on a dry day for distributing worm casts, then rolling for fixing the grasses in the soil, and making all smooth for the next operation—mowing.

WEEDS AND WORMS.

Many lawns are rendered unsightly by weeds such as plantains, daisies, dandelions, buttercups, and thistles. Lawn sand is supposed to be a remedy for daisies, and in some cases has done good, but it is useless against deep-rooting weeds; while if applied too freely it is apt to destroy grasses, so its use cannot be unreservedly advised. Nor is the plan of dropping vitriol into the hearts of weeds for destroying them altogether satisfactory. It has banished plantains from lawns, but deep-rooted weeds, though killed at the top, are apt to produce numerous growths from within the soil, and it must not be forgotten that vitriol burns clothes, shoes, or hands that it touches. Petroleum answers much the same purpose, and is safer; cut off the heads of the weeds, leaving the fleshy roots in a small cavity, which fill with the oil, and as it passes down fill again, not allowing it to spread on the grass, and the weeds will be

slow in growing again, especially if the roots are "doctored" in hot and dry weather, when they cannot be drawn out.

The oldest method of weed extermination is the most effective in the end. Early in the spring, or during mild weather in the autumn and winter, in fact any time when the ground is moist and soft, deep-rooted weeds may be disposed of by means of a "daisy grubber" or dock-weeder, an illustration of which is given—Fig. 42. When the prongs of this are well inserted under the head of a plant, the leverage effected by pressing down the handle will draw it out by the roots. A clearance of these coarse weeds often leaves bare patches; on these sow grass seeds freely, cover with fine soil, roll, and pleasant verdure will follow.

While worms increase the fertility of soil, they are, when numerous, considered objectionable on lawns. The simplest method of eradication is soaking the ground in the spring with clear lime water, and collecting the worms as they come to the surface. This will also tend to destroy moss and slugs. A pound of lime in lumps is sufficient for three or four gallons of water. Stir well; let the particles settle and use the clear water only; lime water cannot be made strong enough to injure a lawn or any garden plants except, perhaps, those of the Heath family. Watering lawns with a solution of corrosive sublimate (bichloride of mercury), half-an-ounce dissolved in 15 gallons of water, will cause worms to come to the surface, but care must be taken that fowls do not eat them, or the birds will be poisoned.



Fig. 42. LAWN WEEEDER.

MOWING AND EDGE TRIMMING.

Mowing *established* lawns ought to commence early, or when the grass can be closely shaven down with a machine. "Bottoming" it well renders the grass easier to cut throughout the season. The more frequently mowing is done the easier and the better in appearance the lawn. The mowing should be persevered with well into the autumn, leaving the grass very short for the winter both for appearance sake and for greater ease in keeping it free of leaves. Mowing machines have been greatly improved of late years, and they cut more cleanly, as well as work more easily than of old, that is, when kept in good order, and a fair chance is afforded them on the lines suggested. The first cutting of seedling grasses on new lawns should not be done closely with a machine, but, as stated on page 76, "switched over" with a sharp scythe.

Neatly-cut verges are also much to be desired. Edging shears alone are not sufficient for keeping them in a presentable condition. Every spring the edges ought to be closely shaven. First flatten them with a turf beater, then strain a line along so as to be just inside of any hollows there may be, keeping it in place with pegs, as shown on page 72. When rounding curves use pegs freely for securing a smooth outline, then with an edging iron or turf cutter neatly shave off all the turf outside the line. This will leave a clean edge with a slight inward slope, and each time the verge is mown, protruding grass can be rapidly cut with either edging shears or a machine made for the purpose. Annually shaving off the edge is liable to unduly narrow the verge, and to widen the walks or drives. This can be remedied by cutting through long lengths of the turf, drawing rather wide strips out, making them level and firm, then filling in behind with fresh turf, and edging as before. This plan answers much better than trying to place fresh strips on the outside of the old turf to gradually crumble away.

MOUNDS AND DELLS.

While flat even surfaces may not be objected to by all persons as characteristic of the ornamental portions of their gardens, yet mounds and dells in appropriate positions impart picturesqueness, and may also serve other desirable purposes—mounds facilitating the masking of buildings which may be the reverse of ornamental; dells forming secluded retreats that are often particularly enjoyable.

When it is desired to form mounds to be planted with trees and shrubs, either for hiding obtrusive buildings or affording diversity—and they may do both at the same time—nothing should be wasted that may be of service in forming them. Excavations for buildings and cellars afford materials that may be utilised for the purpose; and, in the absence of these, the necessary amount can be dug from thoughtfully-chosen positions, and thus both dells and mounds may be formed at the same time by the mere transference of soil. A point to be remembered is that any hard stony subsoil may form the core or basis of mounds, if covered with a depth of two feet of fertile soil in which to plant. In all such work, then, let this be the line of action—bury all the worst material, and reserve all the best soil for the surface.

Instead of planting on the level, effective screens are obviously far more quickly provided if mounds or ridges are formed where desired, wide enough to hold a central row of tall growing conifers or other suitable trees, clothing the bank with

laurels, rhododendrons, and a variety of evergreen and flowering shrubs. In some instances, where the back of a mound is not conspicuous, the taller trees should be planted there, dwarfier and choicer kinds on the wide slope to the front. In this way drives may be quickly shut in, and walks rendered additionally enjoyable. The fronts of mounds may often be usefully supported, as well as made much more attractive, by walls of rough stones, over which various kinds of plants will throw charming tresses of flowers and foliage. Visitors to Dulwich Park, near London, especially in May, when many hardy rockery plants are flowering, cannot

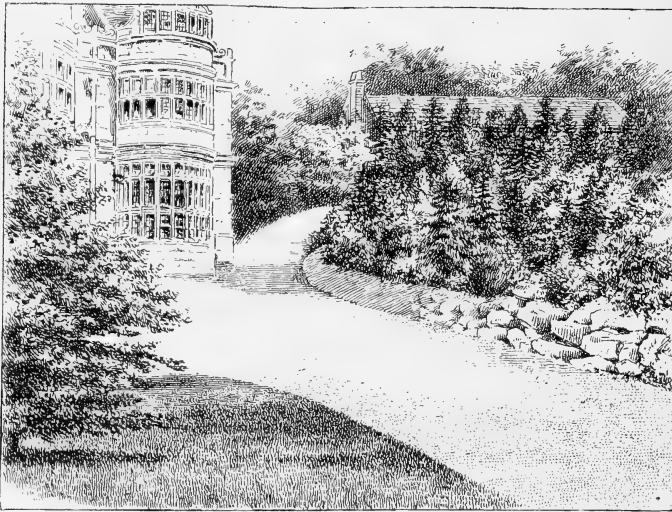


Fig. 43. PLANTING ON A MOUND—STABLE OBSCURED.

fail to note how beautiful both mounds and walks can be made in the simple manner described, and which is fortunately applicable to the largest parks or the smallest gardens.

Whether mounds shall be oval, oblong, triangular, crescent-shaped, high or low, must be decided according to circumstances, and the main object in view. They often greatly improve the approaches to residences, and are made to fit usefully and ornamentally between the drive to the front door and the connecting road to the stables. The advantage of planting on mounds, for obscuring buildings at once, will be obvious

by a glance at the two contrasting illustrations, Figs. 43 and 44. The mounds may be supported by a bank of turf or of rockwork, as shown.

If the fronts of the mounds are somewhat thinly planted, hardy herbaceous and other flowering plants may be interspersed among the shrubs. Mounds of herbaceous plants alone seldom prove satisfactory, but mounds, and in fact dells too, may be effectively furnished with ivies, especially in elevated positions, as a groundwork for not too closely planted trees. Ivies are represented in great and pleasing variety, differing in habit of growth, also in the size, shape, and colour of their leaves. They ought to

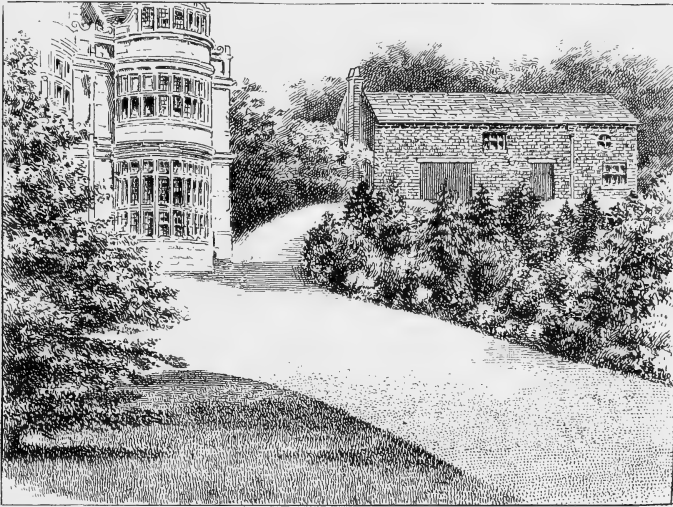


Fig. 44. PLANTING ON THE LEVEL—STABLE EXPOSED.

be planted so that each variety may display its individual characteristics. Allowing a general interlacing, with the inevitable result of the strong growers overrunning and spoiling the more slender and beautiful, is a great and too common mistake. The full decorative effect of ivies can never be seen in the absence of supports to which the growths can cling. Let these be substantial, varying from a log two or three feet above ground to tree stems of thrice the height. Many ivies thus treated form imposing pyramids and pillars, and these when pleasingly associated produce a unique effect, as may be seen near one of the entrances to the park previously mentioned.

Mounds are associated with dells as one is the complementary of the other. Very small dells are scarcely desirable unless for the purpose of grouping British ferns, many of which thrive admirably in hollows formed by overhanging crags as well as in masses more in the open. It is in these cosy, sheltered nooks that a few palms, dracænas, and other fine-foliaged plants can be arranged to the best advantage in the summer, forming with the ferns a charming feature.

Dells are far from being so attractive as desirable when there are no overhanging trees to afford the requisite amount of shade, and positions must be chosen accordingly; at the same time healthy young trees grow rapidly when well planted in good soil. The most enjoyable dells, however, are those which nature has been largely instrumental in forming, and which are not very limited in extent, with trees growing down the slopes to give the requisite shade, yet not so much as to prevent the growth of a variety of wild flowers. It is here if anywhere that good opportunities are afforded for forming what is termed a "Wild Garden"—a free and easy arrangement of a variety of hardy flowering and fine-foliaged plants which, after they are once established, may safely be left to take care of themselves—that is to say, grow wild.

In order to make room for a good collection of plants suitable for the purpose it may be necessary to root up more or less of the native undergrowth, and, before planting, paths should also be formed, but not of a trim, conventional character, near which dwarf or trailing plants may be established. If there happen to be a pond in the dell, or one can be made from a running brook, the path should curve round it, at a distance from the margin of from 2 feet to 6 feet, plants being grouped in some of the spaces between the walk and the water. Where the walk comes in contact with a brook or the neck of a pond, it may be crossed by a rustic bridge, which is often a pleasing feature.

For naturalisation in woods and dells generally, no plants succeed better, or afford more pleasure, than the bulbous-rooted kinds. Narcissi or daffodils are particularly effective when given a fair chance at the outset. All the trumpet daffodils are worthy of a place in woodland collection; and the same may be said of the charming "poeticus" section, commencing with the early flowering ornatus and the Burbidgei type, following with the common "Pheasant Eye," and finishing with the "gardenia-flowered" (*narcissus poeticus flora plenus*).

Mr. W. Robinson, a gentleman who has done much towards naturalising garden flowers in woodlands, remarks that for this purpose "the most important of all early

flowers is the narcissus. Five years ago I planted many thousands in the grass, the most important being the star narcissus (*n. incomparabilis*, etc.). They have thriven admirably, flowered well and regularly. They are delightful when seen near at hand, and also effective in the distance. With the common English, Irish and Scotch trumpet daffodils I have had good results. The Tenby daffodil is very sturdy and pretty. A very delightful feature of the narcissus meadow gardening is the way great groups in succession follow each other. I also cleared a little valley of various fences. Through this runs a streamlet, and we grouped the Poet's narcissus near it, and in a small orchard that lay near, and through a grove of oaks. The whole landscape is a picture annually, such as one might see in an Alpine valley." What can be done in Sussex is equally likely to prove a great success when put into practice elsewhere.

Who has not seen the beautiful expanses of wood hyacinth (*Scilla nutans*) in various parts of the country? And why not add more plants of a similar nature, with a view to their becoming naturalised? Grape hyacinths (*Muscari botryoides*), musk hyacinth (*Muscari moschatum*), anemones in variety, snowflakes (*Leucoium*), snowdrops, crocuses, Stars of Bethlehem (*Ornithogalum*), St. Bruno's Lily (*Anthericum liliastrum*), Winter Aconite, dog's tooth violets (*Erythronium dens canis*), and common tulips might all be planted in woods, dells, and portions of lawns not mown till late in the season—not dotted about thinly, but arranged in bold groups, after the manner of those found wild in nature.

Then, again, what can be more beautiful than some of our banks in the country clothed with primroses, violets, and a variety of other wild flowers and grasses? Even these can be imitated or perhaps improved upon in private grounds and public parks, by planting masses of coloured primroses, including polyanthuses, cowslips, also the robust-growing Alpine auriculas. See also appended list of plants suitable for banks and other dry positions.

The ever-popular Lily of the Valley (*Convallaria majalis*) is one of the best of plants for naturalising in woods and dells, and easy to establish in colonies, the naturally formed leaf soil to be found in dry ditches in most woods suiting them well. Plants suitable for marshy places will be dealt with in the chapter upon Water Scenes; but special mention may yet be made of the globe flowers (*Trollius*), forget-me-nots (*Myosotis*), and the marsh marigold (*Caltha palustris*), as being suitable for these positions. Plants for draping and beautifying the stems of trees are enumerated at the conclusion of these notes, and it only remains to add that few are more enjoyable than the common honeysuckle (*Lonicera periclymenum*) in variety.

One of the great drawbacks to planting in woods is the destructiveness of rabbits; and if they are not kept well within bounds it is next to useless planting many beautiful shrubs and plants in other than enclosed quarters. In the event of its proving difficult, or undesirable, to clear out rabbits, rabbit-proof trees, shrubs, and flowers, of which lists are given, ought to be planted.

Plants suitable for the wild garden, for dells and woodland scenery generally also are by far the most effective when arranged in bold masses, keeping the species and varieties of a genus together; they can then be accorded congenial positions, as some kinds enjoy richer and more moisture-holding soil than others; while many delight in shade, and others require sun.

In every case the intended sites should be broken up thoroughly, and enriched, if needful, with leaf soil or decayed manure. Placed in rough, lumpy ground, the majority of the plants would fail, whereas, if given a good start, they soon root out into the surrounding soil, and require little further attention beyond keeping free from over-encroaching weeds. If the surroundings are kept neat and trim, the peculiar charm of the idea is lost, because the wildness is dispelled.

The following plants, briefly described, are suitable for the purpose in question. Some are recommended for their foliage only, but the great majority are flowering plants. They are arranged alphabetically, and not in order of merit.

PLANTS FOR DELLS AND WOODLANDS.

- ACANTHUS** (Bear's-breech).—The best of these are *A. latifolius*, *A. mollis*, and *A. spinosissimus*; growth vigorous, with large, handsome leaves, and conspicuous flower spikes. The plants thrive in most positions, and are recommended for the margins of walks and banks. Increased by division and seeds.
- ACHILLEA** (Yarrow).—This family comprises several species, admirably adapted for planting in dells. *A. Eupatorium* is, perhaps, the best for the purpose, and with this may be associated *A. ptarmica flore-pleno*, and *A. millefolium roseum*. The first-named is synonymous with *A. filipendula*, and attains a height of from 3 feet to 4 feet. Some of the less vigorous growers are also suitable for planting near the walks, and will thrive in poor soil. Division, cuttings, and seeds.
- ACONITUM** (Monkshood).—Well-known, strong growing plants, which flower admirably in almost any position, including the sides of ditches. There are several varieties, all having poisonous roots. Showy and perfectly hardy. Division and seeds.
- AJUGA** (Bugle).—Small, hardy, free-flowering, and easily propagated plants. *A. genevensis* succeeds in boggy soil. The flower spikes attain a height of from 6 inches to 1 foot, and the colour varies from blue to rose and white. Division and seeds.
- ALLIUM**.—This branch of the onion family ought to be largely grown in woods and dells. The white-flowered *A. neapolitanum* is most preferred, and the sky-blue Siberian form—*A. azureum*—is well worth trying. Division of bulbs and seeds.
- ALSTRÖMERIA**.—In dry, hot positions this bulbous-rooted class of plants thrive and flower strongly every season. *A. aurantiaca* is the species most generally planted in the wild garden.
- ALTHEA** (Marsh Mallow).—Nearly all the species, including *A. rosea* or the hollyhock, are well suited for planting in woods, while *A. officinalis* (Common Marsh Mallow) is most at home in moist ground. Division, cuttings, and seeds.
- AMPELOPSIS** (Virginian Creeper).—Grown for the same purpose as the *aristolochia*, and covers a large

amount of space quickly. Both these rambling plants might take the place of ivy in many instances with advantage. Cuttings and layers.

ANEMONE (Wind Flower).—For woodland scenery anemones are indispensable. Once well established the charming *A. apennina*, blue, would spread and flower almost as freely as the common wood anemone. *A. nemorosa* requires shade, but *A. pulsatilla*, *A. palmata*, *A. coronaria*, and *A. fulgens* should be planted in the open, while bold masses of the Japanese species, *A. japonica*, would prove highly effective. Division, cuttings of the roots, and by seed.

ANTHERICUM.—These handsome bulbous-rooted plants ought certainly to be grown in woods and dells. *A. liliastrum*, St. Bruno's lily, and the less vigorous-growing *A. liliago*, St. Bernard's lily, are among the best. Division and seeds.

ANTIRRHINUM (Snapdragon).—These are very showy, and succeed well in various sites, and those of a hot and dry nature suit them well—after they are once established. Cuttings and seeds.

AQUILEGIA (Columbine).—For planting in rough places and for thriving under difficulties none of the members of this fairly large and showy family excels *A. vulgaris* and its varieties, *A. chrysantha* being also particularly well adapted for the woods. Division and seeds.

ARISTOLOCHIA SIPHO (Great Birthwort, also called the Dutchman's Pipe).—A rapid climber with enormous leaves, ornamental when covering the stems of trees, and is quite at home in the woods. Cuttings under a bell-glass.

ASPHODELUS (Asphodels).—Without deserving to be termed beautiful, asphodels are yet to be recommended for the wild garden, as they will grow strongly almost anywhere. Increased by division.

ASTERS (Michaelmas Daisy or Starworts).—Masses of these are very showy in the autumn when most other plants have ceased to flower. They grow vigorously in comparatively poor soil, and should be extensively planted. *A. Amellus*, *A. Pyrenæus*, and *A. turbinellus* are among the best that can be grown. Division and seeds.

ASTRANTIA (Masterwort).—Though not showy, this small family is yet worthy of mention, owing to the readiness with which the plants take to banks and woodlands generally, also thriving well in damp positions. Division.

BAMBUSA (Bamboo).—In the more southern parts of the country several bamboos are quite hardy, and well suited to sheltered dells. Plant such graceful species as *B. aurea*, *B. falcata*, *B. Metake*, and *B.*

Simmondsi in good, moist soil, and they may then be depended upon to thrive and attract attention. Division.

CALYSTEGIA (Bindweed).—*C. dahurica* is a very fine white-flowered species that should have a stout stake or old tree stem to twine round, similar treatment being given *C. grandiflora* and *C. pubescens plenus*. Division and seeds.

CAMPANULA (Bell-flower).—This fine class of plants is particularly imposing when grouped in the wild garden. A moderate amount of cultivation would be required by such superior tall-growing species as *C. latifolia*, *C. persicifolia*, and *C. pyramidalis*; but *C. rapunculoides* is a tall grower, and soon makes itself at home. The dwarf species, or those attaining a height of from 9 inches to 2 feet, and with which may be included our own native harebell, *C. rotundifolia*, are more suitable for banks and frontages, and after once they are well rooted, give very little trouble. Some of the best of these are *C. carpatica*, *C. glomerata*, *C. Hendersoni*, *C. turbinata*, and *C. pallida*. Division, cuttings, and seeds.

CENTRANTHUS RUBER (Red Valerian).—Ranks among the hardiest, showiest, and most easily-grown plants for a wild garden. After being established for two years or so, seedlings spring up, and these grow strongly and flower freely in sites where scarcely any other flowering plant would survive. *C. rosea* is inferior in point of colour only. Seeds.

CLEMATIS (Virgin's Bower).—Abundance of the commoner kinds ought to be found growing in the woods, rambling over old tree stumps, scrubby bushes, rocks, and bowers. Those most recommended for this style of planting are *C. montana*, *C. viticella*, *C. cirrhosa*, *C. cœrulea*, *C. flammula*, *C. Jackmanni*, and the well-known wild form, *C. vitalba*, or Traveller's Joy. Give them a rich loamy soil to start, and they will thrive and flourish abundantly. Layers, cuttings, and seeds.

DELPHINIUM (Larkspur).—The strong-growing, herbaceous species succeed in woods and dells if given a little rich soil at the outset. Varieties of *D. hybridum* are among the best, these attaining a height of from 3 feet to 4 feet. *D. cardinale* and *D. exaltatum* are also strong growers, and effective when massed in the background. Division, cuttings, and seeds.

DICENTRA (Dielytra, Bleeding Heart).—Too often this beautiful class when planted quite in the open are cut down by spring frosts, whereas if planted where they get the benefit of shelter from trees they seldom suffer to any appreciable extent. *D. eximia*

- attains a height of 12 to 18 inches, has handsome fern-like foliage and reddish purple flowers in drooping racemes. *D. spectabilis* (Lyre flower), the best-known species, is taller growing and very floriferous. Colour rosy red; light rich soil. Division.
- DIGITALIS** (Foxglove).—Beautiful in masses in woodland scenery, the wild species in semi-shady spots, and the choicer spatted forms in more conspicuous positions. Easily raised from seeds, in May. Grow the plants thinly in open positions, and replant in the autumn.
- DORONICUM** (Leopard's Bane).—These early flowering herbaceous plants are all yellow in colour, and easily grown. *D. altaicum*, *D. austriacum*, and *D. caucasicum* are suitable for the front rows, *D. plantagineum* and *D. pardalianches* growing more strongly, sometimes attaining a height of 3 feet. Division.
- EPILOBium** (Willow Herb).—In masses these are remarkably effective, and easily established in woods or alongside water-courses and ponds. *E. angustifolium*, crimson, and *E. a. album*, white, attain a height of 3 to 5 feet, and are the most desirable species. *E. hirsutum*, the common British form, also grows to a height of 3 to 5 feet, and is very showy. Division.
- ERYNGIUMS** (Sea Holly).—These noble plants are particularly well adapted for the wild garden. Some of the best species for the purpose are *E. alpinum*, 2 to 3 feet; *E. amethystinum*, 2 to 3 feet; and *E. giganteum*, 2½ feet. Succeed in a light, dry soil. Division and seed.
- FERNS**.—British ferns are ideal plants for dells and woodlands. *Athyrium*s require good loamy soil and a moist position. *Blechnum spicatum* in variety succeeds best in a mixture of loam and peat, and may have sunny positions. *Cystopteris fragilis* prefers shade and dry stony ground. *Lastrea filix-mas* varieties are not particular as to soil and bear exposure. *Lastrea cristata*, *L. spinulosa* and *L. dilatata* varieties enjoy rich loam with leaf soil and a shady bank. *L. montana* and *L. thelypteris* a damp, cool position. *Osmunda regalis* and *Polypodium alpestre* thrive best in peat and loam in a moist situation. *Polypodium dryopteris*, *phlegopteris*, and *Robertianum* require shade. *Polypodium vulgare* in variety like a dry situation with stiff clay soil and stones to cling to. *Poly-stichum aculeatum* and *P. angulare* in variety plant in loamy soil with stones in partial shade. *Scolopendrium vulgare* in variety should have a mixture of good loam and peat or leaf soil, and a well-drained site. Division and shores.
- FUNKIA** (Plantain Lilies). Hardy, fleshy-rooted plants suitable for planting near walks, where the bold foliage and flowers will be seen to the best advantage. *F. Fortunei*, *F. corulea*, *F. Sieboldi*, *F. grandiflora* and *alba* are effective. Division.
- GERANIUM** (Crane's Bill).—All the hardy herbaceous geraniums are admirably adapted for planting alongside woodland walks, where they soon become established. Some of the best are *G. cinereum*, *G. lancastricense*, *G. ibericum*, and *G. pratense album*. Division and seeds.
- HELLIANTHUS** (Sunflower).—The herbaceous species are easily established in rough places, spreading rapidly and flowering grandly during the summer. *H. decapetalus* and the multiflorous forms are among the best, attaining a height of from 3 feet to 4 feet.
- HELLEBORUS** (Christmas and Lenten Roses).—Though not often seen in the wild garden or in sheltered sites generally, they are yet well suited to these positions. The earliest to flower are the Christmas roses or *H. niger*, and the superior forms *H. n. angustifolius*, *H. n. major*, and *H. n. maximum*, while good representatives of the Lenten rose section are *H. guttatus* in variety, *H. viridis*, *H. orientalis*, of which also there are several forms, and *H. punctatus*, a hybrid. Good garden soil and manure. (See coloured plate of these flowers.) Division and seeds.
- HERACLEUM** (Cow-parsnip).—Too coarse for the cultivated garden, *heracleums* are yet to be recommended for the wild garden, as they present a stately sub-tropical appearance viewed from a distance or in the openings that occur. *H. giganteum*, synonym *H. villosum*, attains a height of 9 to 12 feet, and *H. sibiricum* 5 to 6 feet. Seeds or division.
- HYPERICUMS**.—Most of the *hypericums* grow and flower abundantly in woods, while the best known of the family, *H. calycinum*, or St. John's Wort, spreads rapidly, quickly clothing dry banks with growth which, during the flowering period, presents a gay appearance. Division, cuttings, and seeds.
- POLYGONATUM** (Solomon's Seal).—These old-fashioned border plants succeed admirably in shady woodlands, and should be extensively planted. Division.
- POLYGONUM** (Knot Weed).—Both *P. cuspidatum* and *P. sachalinense* are well suited to the wild garden. The former attains a height of from 4 feet to 8 feet, and the latter grows still taller, both branching strongly.

PYRETHRUM (Feverfew).—Of this showy family the best for the woodland are *P. uliginosum*, 5 feet, and *P. Tchihatchewi*, 2 feet. The latter succeeds in dry shady places where many plants fail. Division.

ROSE.—For the wild garden the most appropriate are the Ayrshire, Austrian briar, boursault, berberifolia, hybrid China, damask, microphylla, garland, and

semperflorens species. Plant where they have something to ramble over, and leave them alone. Layers, budding, and cuttings.

TRITOMA (Flame Flower).—Very showy though not quite so hardy as desirable. Partial shelter sometimes preserves them through the winter, when, perhaps, those quite in the open are destroyed by frost. Division.

SELECTIONS OF TREES, SHRUBS, AND PLANTS FOR NATURALISATION.

RABBIT-PROOF TREES AND SHRUBS.

Berberis (*Mahonia*) *aquifolia*, 3 to 6 feet.
 ,, *Darwini*, 2 to 4 feet.
Buxus sempervirens (Common Tree Box), 6 to 10 feet.
Cerasus Lauro-cerasus colchica (*Colchic Laurel*), 6 to 10 feet.
Cerasus lusitanica (*Portugal Laurel*), 10 to 20 feet.
Cornus sanguinea (*Dog-wood*), 6 to 8 feet.
Cotoneaster Simmonsi, 5 to 8 feet.
Daphne laureola (*Spurge Laurel*), 3 to 4 feet.
Deutzia scabra, 4 to 8 feet.
Euonymus (*Spindle Tree*), 6 to 15 feet.
Gaultheria Shallon, trailing.
Hibiscus Syriacus, 6 feet.

Lonicera (*Honeysuckle*), in variety.
Philadelphus coronarius (*Mock Orange*), 5 to 8 feet.
 ,, *grandiflorus*, 6 to 10 feet.
Rhododendron ponticum, 6 to 12 feet.
Rubus strigosus (*American Raspberry*), 3 feet.
Ruscus aculeatus (*Butcher's Broom*), 2 feet.
 ,, *racemosus* (*Alexandrian Laurel*), 4 feet.
Symphoricarpos racemosus (*Snowberry*), 4 to 6 feet.
Syringa persica (*Persian Lilac*), 4 to 5 feet.
 ,, *vulgaris* (*Common Lilac*), 8 to 12 feet.
Taxus baccata (*Common Yew*), 15 to 30 feet.
Weigela rosea, 5 feet.

RABBIT-PROOF FLOWERING PLANTS.

Anemone coronaria.
 ,, *Japonica*.
Arabis.
Artemisia abrotanum.
Asphodelus albus.
Aubrietias.
Campanulas.
Cineraria maritima.
Delphiniums.
Dog's-tooth violets.
Hemerocallis.

Irises.
Liliums.
Lily of the Valley.
Lunaria.
Muscari.
Narcissi.
Ornithogalums.
Pansies.
Periwinkles.
Phloxes.

Poppies.
Primroses.
Scillas.
Solomon's Seal.
Stachys lanata.
Tritomas.
Violets.
Winter Aconite.
Woodruff.
Yucca gloriosa.

PLANTS FOR GROWING UNDER TREES.

Anemone angulosa.
 ,, *appennina*.
 ,, *blanda*.
 ,, *coronaria*.
 ,, *fulgens*.
 ,, *Hepatica*.
 ,, *stellata*.
 ,, *sylvestris*.
 ,, *trifolia*.
Arum italicum.

Bulbocodium vernum.
Corydalis solida.
 ,, *tuberosa*.
Cyclamens, in variety.
Eranthis hyemalis.
Erythronium dens-canis.
Ficaria grandiflora.
Snowdrops, many kinds.
Snowflakes, all the kinds.
Iris reticulata.

Muscari, any of the numerous kinds.
Narcissi, in variety.
Puschkinia scilloides.
Sanguinea canadensis.
Scilla bifolia.
 ,, *sibirica*.
 ,, *campanulata*.
Trillium grandiflorum.
Tulipa, species, in variety.

PLANTS FOR MOIST, RICH SOIL.

Althæa, in variety.	Galax aphylla.	Phlomis Russelliana.
Astilbe rivularis.	Galega officinalis.	Physostegia speciosa.
Aralia edulis.	Gentiana asclepiadea.	Phytolacca decandra.
„ nudicaulis.	Helianthus multiflorus.	Ranunculus amplexicaulis.
Asclepias Cornuti (Syriaca).	„ orgyalis.	„ parnassifolius.
Asphodelus ramosus.	„ rigidus.	Rudbeckia, in variety.
Asters, in variety.	Helonias bullata.	Sanguinaria canadensis.
Baptisia exaltata.	Hemerocallis, in variety.	Solidagos, in variety.
Caltha palustris (fl. pl.). [kinds.	Heracleum, „	Silphium, in variety.
Campanula glomerata, and large	Iris ochroleuca.	Spiræa aruncus.
Colchicums, in variety.	Liatris, in variety.	Wertia perennis.
Convallaria multiflora.	Lythrum roseum superbum.	Telekia (Bupthalmum) speciosa.
Datisca cannabina.	Mimulus, in variety.	Thalictrum, in variety.
Echinops, in variety.	Narcissi, stronger kinds.	Trollius, „
Epilobium, „	Oenothera, large kinds.	Veratrum, „
Eupatorium, in variety.	Phlomis herba-venti.	Polygonum, „

PLANTS FOR GROWING ON MOUNDS, BANKS, AND IN POOR SOIL.

Acantholinum glutaceum.	Genista sagittatis.	Pentstemon procerus.
Achillea aurea.	Gentiana acaulis.	Phlox amœna.
Ajuga genevensis.	Geranium cinereum.	„ stolonifera.
Alyssum saxatile.	„ striatum.	„ subulata.
Anthyllis montana.	„ Wallichianum.	Polygonum Brunonis.
Armeria cephalotes.	Gypsophila repens.	Saxifraga aizoon.
Aster alpinus.	Helianthemums.	„ crassifolia.
Aubrietias.	Iberis sempervirens.	„ cotyledon.
Campanula carpatia.	Iris cristata.	„ longifolia.
„ fragilis.	„ nudicaule.	Scabiosa caucasica.
„ gracilis.	„ reticulata.	Scutellaria alpina.
Cerastium Biebersteini.	Linum alpinum.	Sedum dentatum.
„ tomentosum.	Oenothera speciosa.	„ kamschatcicum.
Cornus canadensis.	„ taraxacifolia.	„ Sieboldi.
Dielytra eximea.	Orobus lathyroides.	„ spurium.
Euphorbia cyparissias.	„ verna.	Stachys lanata.

HARDY BULBS FOR NATURALISATION.

Aconite, winter.	Colchicum, in variety.	Muscari, in variety.
Allium Moly.	Cyclamen, „	Narcissus, in great variety.
„ fragrans.	Erythroniums „	Ornithogalum, in variety.
„ neapolitanum.	Fritillarias, „	Scillas, „
„ ciliatum.	Gladiolus, hardy European species.	Snowdrops, all.
Brodicea congesta.	Hyacinthus amethystinus.	Sternbergia lutea.
Bulbocodium vernum.	Leucoium, in variety.	Trichonema (Romulea) ramiflorum.
Camassia esculenta.	Liliums, „	Triteleia uniflora.
Crocus, in great variety.	Merendera bulbocodium.	Tulipa, in variety.

In the selection of the foregoing lists of plants for the positions and purposes indicated, we are mainly indebted to the "Wild Garden" of Mr. William Robinson. When judiciously planted they are, without doubt, capable of adding interest and beauty to mounds, dells, copses, and the surroundings generally of suburban and country residences, which are cherished in various parts of the Kingdom.

ROCKERIES.

A well-arranged and judiciously-planted rockery is a welcome feature in either a large or comparatively small garden. There are positions where even bare bold rocks, naturally grouped, are attractive; but when the arrangement affords sites for a great variety of plants, a beautiful addition is made, and the "rock garden" proves a continuous source of pleasure. Such a wealth of Nature's floral gems, rare or otherwise, are available for planting among stones, that the wonder is more rockeries are not formed in which plants will flourish. There are certainly many which, through errors in construction, can only result in disappointment.

A rockery may be an improvement on Nature, if such be thought possible, or it may be a mere collection of stones jumbled together, and soil worked between them, or else an arrangement of sloping mounds or banks of soil, with stones planted in them, suggestive of a dogs' cemetery. Fig. 45, sketched in a public park, is shown as an example to be avoided. The stones or other materials used ought to be arranged much as they either crop up, or are found in a natural state, and yet with cavities in which soil and small stones are kept in

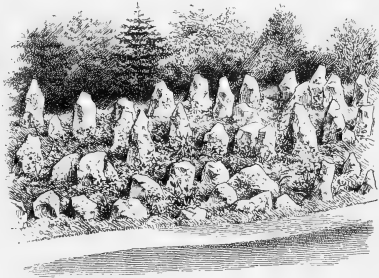


Fig. 45. FAULTY ROCKWORK.—STONES INSERTED IN A SLOPING BANK.

position (not washed away), with a view to affording the cool, moist, deep root-run needed by many of the best of rock plants. It is not a question of building a rough, solid wall, but rather of providing suitable sites for beautiful flowers, without actually departing from Nature's arrangement. The mere fact of placing plants near to stones does not invariably lead to their thriving satisfactorily, while there are only a comparatively few species that will flourish on what are little better than bare ledges.

A rockwork must be serviceable as well as ornamental, a self-evident fact yet too often ignored. Where it shall be formed must be determined by circumstances, and the main object in view. In some instances, a rockwork with a background of ever-green shrubs might prove the readiest means of shutting out from view something that is objectionable, or it may completely surround and enclose an unsightly tank or

small reservoir, located on high ground, formality in either case being easily avoided with the aid of stones of various sizes. Rockwork may be formed quite in the open, for the accommodation of sun-loving alpine plants, or in partially shaded places, more especially when ferns are to be extensively planted. Where there are sunken walks or drives, the banks on the upper side, if there is any difference, afford admirable opportunities for grouping large stones at different spots, much as though they were unearthed during the process of excavation. In those positions, such free-growing plants as ivies in variety, periwinkles (*vincas*), St. John's-worts (*hypericums*), gaultherias, and

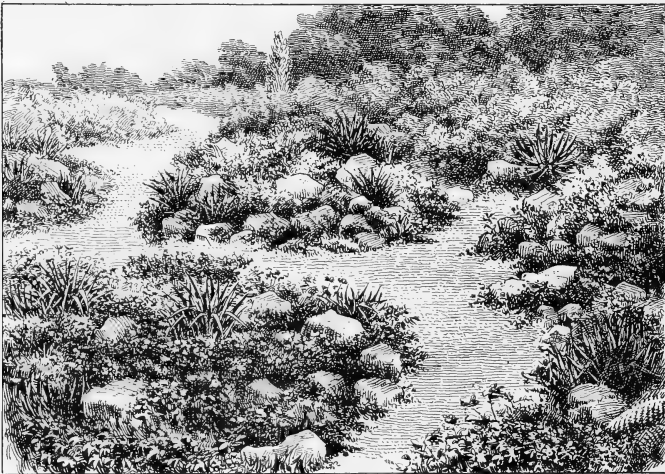


Fig. 46. INFORMAL ROCKY MOUNDS.

others of a similar nature, would be more appropriate than alpiners, though open sites might be found for some of these also. Here and there large stones peeping out of the turf on a bank look most natural, these coming between the groups of rocks.

Whether rockeries shall be large or small ought also to depend upon circumstances. For instance, it would be obviously unwise to attempt anything on a large scale with only enough stones available for a comparatively small group; and certainly a large rockery should not be formed if it is not intended to quickly occupy it with a variety of suitable plants, though it should be remembered that an overcrowded rockery is not nearly so effective as one in which each plant is kept clear of its neighbour, and the

stones not wholly obscured. Alpine plants cannot thrive under forest trees, and if the roots of these find their way, and they travel to a surprising distance, up into a rockwork, the proper occupants may be expected to dwindle away. An old stone quarry is to be met with occasionally conveniently near to a private residence or in a public park, and where this occurs no better site for a rock garden on a large scale could well be chosen. Every advantage ought to be taken of the various irregularities and inequalities usually met with in disused quarries, and walks made to wind in and out among rocks, arranged to meet the requirements of plants that flourish in such positions.

Much may be done towards imitating a natural arrangement of rocks, even when the start has to be made on a perfectly flat, clear space. For instance, a winding walk could be traced out, the best of the surface soil dug and wheeled to one side for future use, and the subsoil banked up on both sides, to form a solid foundation for some of the rockwork. A horse-shoe arrangement would be appropriate in some positions. In the centre might be formed a rockwork for alpenes, and on the opposite side of the walk nooks provided for ferns and other strong-growing plants. With ample space and materials, a series of winding banks and intervening mounds, with sinuous paths between them, leading "up hill and down dale," may be made the congenial home of a host of charming plants that succeed in different aspects, and prove a source of delight to their owners; but in small gardens it is not wise to attempt too much. Simple, informal mounds (Fig. 46), in which plants are happy, being more satisfying and more tasteful than is any evidently pretentious straining for effect. Such mounds, varying in size and shape, can be formed with few stones in appropriate positions by amateurs, in small or large gardens.

When it is thought desirable to introduce caves and other elaborate rock scenes, they can only be properly represented by men experienced in that kind of work. In each and every case where the sites for rockeries are not naturally drained, provision ought to be made for the escape of superfluous water.

For ordinary rockwork little or no cement need be used. It is of good service in the construction of grottos, archways, caves, and other adjuncts, to give solidity, but is not favourable to plant growth. Nor are masses of glittering spar, quartz, or crystallized stones generally well adapted for forming rockwork. It is true they are extensively employed for the purpose, but they are too glaring to please the eye or to be congenial to the plants about them. In caves and grottos they may be effectively

used, but are out of place in a rock garden. The most desirable materials for rockwork that shall be both pleasing in appearance and suitable for plants, are stratified rocks or stones, found in layers of variable thickness, just as deposited in the form of sediment. Among these are comprised limestone, sandstone, and oolite formations; the two first-named proving the best for use in a rock garden. The igneous rocks are not found in strata, as these are the outcome of heat and upheavals, and assume a variety of forms.

Very large stones are not the most desirable for providing healthy homes for alpine



Fig. 47. DIVERSIFIED ROCKERY FOR ALPINES AND FERNS.

and other plants; medium-sized to small stones are, moreover, the easiest to manipulate. Collect as many as possible before commencing to arrange them—a far better plan than using them as they are collected. Have in readiness also a large heap of smaller pieces of limestone, for mixing with the soil; failing this, pieces of granite, sandstone, or other rock obtainable, but the first-named best suits the majority of alpine plants. Ordinary garden soil rarely suffices for these plants, and a suitable mixture of peat, leaf-soil, fibrous loam, sand, and old mortar rubbish must be provided for them; also the planting may often be advantageously proceeded with

as the rocks or stones are grouped; but this depends on the season, and whether the plants are removed from pots or taken from the open ground.

The formation of a rock-garden suitable for the growth of flowering plants, shrubs, and ferns, ought, as previously indicated, to be of a character to provide for deep root action on the part of a variety of mountainous plants that will not thrive unless so accommodated. This can be done, and yet the stones present a natural appearance, much as shown in Fig. 47. It is not a case of forming a sloping bank from which soil and plants may be washed between the stones, but the stones support the soil, and the plants flourish. They can be inspected and attended to in all parts of a rockery, however large, by the provision of rough yet convenient steps, and a

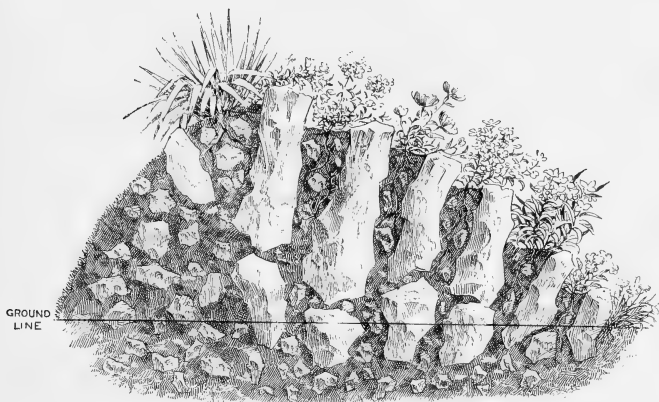


Fig. 48. SECTION OF ROCKERY IN WHICH PLANTS WILL FLOURISH.

rugged path, which may moreover add to the picturesqueness of the whole arrangement.

A glance at Fig. 48, a sectional view of a rockwork arranged somewhat after the manner depicted in the preceding illustration, will explain what should be done. The stones are sunk and disposed on their thickest end, and so project as to offer solid fronts one behind the other. Forming banks of soil and laying the stones one above another on them will not do. In some positions the site should be excavated to a depth of 2 feet, more or less according to circumstances, and if the subsoil be of a clayey nature lay a common 3-inch pipe along the bottom, connecting this with a main drain, or providing a suitable outlet. On the pipes place a layer of coarse stones, then a foot

or so of common stony soil, next a layer of rough stones, among which may be intermingled some of the best of the surface soil thrown out when excavating. The first of the larger stones to show above the ordinary level should be fixed sloping outwards and sunk to half their depth in soil and stones packed tightly about them, and, if need be, to rest on others or a bed of coarse stones and soil, the work proceeding in this way till the highest point is reached, and for which the larger stones ought to be principally reserved.

Instead of the stones pressing against each other, as too often happens, they ought really to be kept well apart, the interstices properly filled in affording the necessary deep, free-rooting medium for the plants. There are right and wrong ways of filling in these fissures between the rocks. If the right way is followed the fissures will be the widest at the top, the smaller stones also being arranged thinnest end uppermost. Should the opposite method be adopted, the stones pinching together near the top, a settlement of soil is bound to take place. Where there is the most space between the rocks at the highest point it will become wedged more tightly to them, whereas it will shrink away from the rocks to an injurious extent when the fissures are widest at the bottom, the plants thriving under one set of conditions and failing under the other. If it should happen that the pockets or fissures be much larger than required for the plants occupying them, flat stones ought to be laid on the surface to arrest undue evaporation of moisture. Let it be clearly understood that the sectional view (Fig. 48) conveys no idea as to the appearance of a front view or elevation of a rockwork, and is given for showing how to provide for the well-being of plants.

Small mounds of stones and prepared soil may be similarly formed as if springing out of the turf on a lawn and not showing more than 18 inches above the ground level. This is mentioned to show that rock-gardens, such as those illustrated on page 90, are within the reach of most owners of small pleasure-grounds.

For the formation of more solid rockwork that is to present a massive appearance, a good supply of large stones will be needed. These ought not to be arranged as formally as a mason would construct a stone wall, but should be of varying thicknesses, though always in the form of regular layers or strata. Some idea of what is wanted can be gathered from Fig. 49—a rockwork formed in a bank alongside a carriage drive. The large stones can be blocked clear of each other with the aid of smaller pieces and soil, the interstices forming a suitable root run for plants that succeed in such positions. If the stones have no appreciable spaces between them, the plants will not thrive.

When stones are too heavy to be moved by hand, recourse must be had to planks, rollers, and levers. Sometimes a tripod of stout scaffold poles with blocks and strong chains have to be used for raising heavy stones to the required height. It is of the greatest importance that a perfectly solid foundation be formed. Each layer of stones should be kept slightly higher in front than at the back, and the soil packed firmly about them from behind. Unless these precautions are taken the whole mass might, sooner or later, pitch forward. Strong-growing shrubs about this class of rock-



Fig. 49. MASSIVE ROCKWORK (SOMETIMES FORMED ARTIFICIALLY WITH COMPOSITION).

work soon overgrow and ruin the rock plants proper, and detract from the appearance generally.

Nurserymen supply plants for rockwork in small pots, and from these they may be planted direct—preferably in the spring. It is most important that the soil in the pots be in a moist, but not sodden, state when turned out for planting. Very little of it should be removed, and the plants must be placed a little deeper in the rockery than they were in the pots, pressing the soil firmly down against the roots and not round the stems merely. During the rest of the growing season uniform root moisture is essential

for their satisfactory growth. Divisions and home-raised seedlings must also have copious supplies of water as needed. Mere dribbles or daily surface sprinklings in dry weather are worse than useless, as the constant evaporation following is injurious. Warm evenings are the best times for watering, and the best method is an imitation of rainfall sufficient to pass down below the roots. Plants rooting in deep fissures or pockets are the easiest to keep well supplied with moisture, and these grow the most satisfactorily. Some few of the plants that thrive in old walls should be planted according as the imitation of stratified rocks is constructed, but many more might be had by simply sowing seeds on or about the crevices in March or April.

When it is intended to raise a large number of rock plants from seed the start should be made early in March. The requisite number of 6-inch pots, or one for each variety, ought to be extra well drained, and firmly filled with a mixture of fine loam, leaf soil and sand, making this perfectly level. Give a gentle watering, and in the course of two or three hours sow the seeds as evenly as possible, pressing them in with a circular piece of wood. Minute seeds only require to have the lightest of light coverings of fine soil, and those of a coarser nature as much as will just cover them. Carefully label each. A cold frame is the best position for the pots, making the base worm-proof. Let the pots stand closely together and level on ashes or fine mortar rubbish, cover with squares of glass, shade carefully and keep the soil uniformly moist.

In the case of small seeds these are less likely to become dislodged if the soil is moistened by immersing the pots to their rims in a pail of water till the moisture rises upwards through the soil to the surface. Some of the species germinate more or less quickly, while others may be from six months to twelve months before moving, consequently there ought to be no hasty decisions in the direction of turning out the pots. When the seedlings are large enough, and in many instances this will not be till the following spring, place one or three in each 3-inch pot, using fine soil similar to that in which they are raised. Stand them in a cold frame, if possible, till they are well established, then plunge in ashes or sand enclosed by bricks at the shady side of a wall or fence in the open air, and keep them well supplied with water. If no frame can be spared, shelter and shade the newly-potted seedlings with mats. After one year in small pots the plants ought to be large enough for planting in the rock-garden. The commoner kinds may be raised in the open border, sowing the seed either directly it is ripe or in March and April. The seedlings may be placed in small pots, pricked out in boxes or in some instances transferred direct to the rockeries.

As will be seen on reference to the following pages, there is a great wealth of plants and shrubs suitable for various positions in the rock garden. They are, in fact, so numerous that it is difficult to make a selection that shall be fairly comprehensive, yet not, to the majority of readers, oppressively voluminous. In brief descriptions of some of the best rock plants, their native countries are given, also the heights of the plants and colours of their flowers, while suitable soil and positions are noted, and methods of increase indicated.

PLANTS FOR ROCK GARDENS.

ACENA.—*A. MICROPHYLLA*, native of New Zealand; height 1 inch to 2 inches; neat, close-growing evergreen; flowers green with crimson spines, produced in the summer. Plant in ordinary garden soil—increase by division, cuttings, and seeds.

ACANTHOLINUM.—A small family with flowers not unlike *Statice*. *A. glumaceum* (prickly thrift), Armenia; height 6 inches, compact; rosy flowers abundant in summer. *A. venustum* (charming), height 6 to 8 inches; flowers rose: summer. Sunny positions and sandy soil surfaced with stones. Cuttings, and seeds.

ACHILLEA (Milfoil).—Many species suitable for the rock garden. *A. Clavenna* (Mrs. Clavenna's), Austria; height 9 to 12 inches; hoary leaves, flowers white: spring and summer. *A. tomentosa* (downy), European Alps; height 6 to 12 inches; flowers yellow: summer. *A. umbellata* (umbel-flowered), Greece; height 4 to 5 inches; silvery leaves, flowers white: June. Ordinary garden soil, division in spring, root cuttings and seed.

ÆTHIONEMA (Lebanon Candytuft).—Height 6 to 8 inches; neat growth, flowers rosy lilac, abundant in June. *Æ. grandiflorum* (large-flowered), Mount Lebanon; height 18 inches; flowers warm shaded rose: May to August. Margins of rock-work and light sandy soil; cuttings in summer and seeds.

ALYSSUM (Madwort).—Shrubby perennial section, admirably adapted for rockeries. *A. montanum* (mountain), Europe; height 2 to 3 inches; flowers yellow, sweet-scented: April and May. *A. olympicum* (Olympian), north Greece; height 2 inches to 3 inches; flowers deep yellow: summer. *A. saxatile* (rock), Eastern Europe; height 1 foot; flowers bright yellow, profuse: spring. *A. saxatile variegatum*, a variegated form of preceding; exposed position. *A. gemonense sulphureum* (sulphur),

free, distinct, ordinary soil; division, cuttings under handlights, and seed.

ANDROSACE.—A very desirable race of rock plants. *A. carnea* (rose-flowered), Switzerland; height 3 to 4 inches; flowers in July. *A. chamæjasme* (rock jasmine), Austria; height 3 inches; flowers deep



Fig. 50. *ANDROSACE LANUGINOSA*.

pink: April to June. *A. lanuginosa* (woolly-leaved), Himalayas; height 6 to 8 inches; flowers delicate rose: June to October (see woodcut, Fig. 50). *A. obtusiflora* (blunt-leaved), European Alps; height 6 to 9 inches; flowers white and rose: spring. *A. villosa* (hairy), Pyrenees, tuft habit of growth; height 2 to 4 inches; flowers

flush rose : May. *A. Vitalliana*, Pyrenees, dense growing; height 1 inch to 2 inches; flowers yellow : May to July. Well-drained positions, fissures between rocks, sandy loam and peat with limestone chippings; division, cuttings and seeds.

ANEMONE (Wind Flower).—A large and popular family.

A. alba (white), Siberia; height 6 inches; flowers in June. *A. alpina* (alpine), Central Europe; height 6 inches; flowers various colours : April and May. *A. angulosa* (angled), East Europe; height 8 to 12 inches; flowers sky blue : February. *A. blanda* (fair), Eastern Europe; height 6 inches; flowers sky blue : spring. *A. coronaria* (garland), South Europe, species comprise single and double varieties; height 6 to 9 inches; flowers various shades : April and May. *A. hepatica* (common hepatica), mountains of Europe; height 4 to 6 inches; flowers

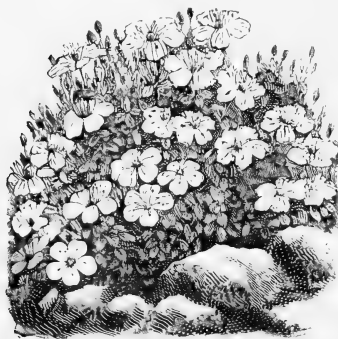


Fig. 51. *ARENARIA HUTERI*.

single and double, white, blue, and reddish pink : spring. *A. palmata* (palmate), South Europe; height 6 to 8 inches; flowers white : May and June. *A. ranunculoides* (ranunculus-like), Europe; height 3 inches; flowers yellow and purple shades : March. *A. vernalis* (spring), colder parts of Europe; height 6 inches; flowers white and violet : March. Sunny, sheltered, well-drained positions; deep rich soil, peaty soil for the more delicate growers; herbaceous species by division, tuberous section by seed. Tubers of choice species to be lifted in July or August and stored in sand to February.

ANTENNARIA.—A charming family of little Alpine plants, indigenous or naturalised in England. *A. dioica* (diocious); height 4 inches; flowers pink : June. *A. minima* (smallest) and *A. hyperborea*

are varieties of the preceding. *A. tomentosa* (downy), one of the best of carpeting plants; silvery leaved; any soil. Division.

ANTHYLLIS (Kidney Vetch).—*A. montana* (mountain); height 3 to 6 inches; flowers purplish pink : June. Loamy soil; division and seeds.

AQUILEGIA (Columbine).—*A. alpina* (alpine); height 1 foot; flowers blue with white centre : May. *A. cœrulea*; sky-blue. There is also a white form, and many beautiful hybrids. Height 9 to 15 inches; colours various; April to July. *A. glandulosa* (glandular), Altai Mountains; height 8 to 12 inches; flowers blue, tipped with white : June. *A. leptoceras lutea* (slender-horned, yellow), allied to *A. cœrulea*. *A. pyrenaica* (Pyrenean), dwarf; height 9 to 12 inches; flowers bright lilac blue : Summer. Deep sandy loam and leaf soil, with good drainage. Division and seed.

ARABIS (Rock Cress).—A hardy, free-flowering family. *A. albidia*, whitish. *Tauria* and *Caucasus*. Height 6 to 9 inches; January to May. *A. albidia variegata*, an attractive variegated form. *A. blepharophylla* (ringed leaved), California; height 3 to 4 inches; flowers rosy purple : spring. *A. lucida* (shining); height 4 to 6 inches; flowers white : summer. *A. lucida variegata*, a beautifully-variegated form of *A. lucida*. Position, exposed; common dry soil. Division, cuttings and seeds.

ARENARIA (Sandwort).—*A. balearica* (Balearia); height 3 inches, creeping; flowers white : March to August. *A. montana* (mountain), France and Spain; height 3 inches, procumbent; flowers white : April. *A. purpurescens* (purplish), Higher Pyrenees; height 6 inches, decumbent : May. *A. Huteri*, white, very dwarf, an inch high; position, fronts of rockwork (Fig. 51). Division, cuttings and seed.

ARMERIA (Thrift or Sea Pink).—*A. cephalotes* (round-headed), South of Europe; height 12 to 18 inches; flowers crimson : autumn. Warm position. Deep sandy loam. Division and seed.

ASPERULA (Woodruff).—*A. odorata* (sweet-scented), Britain; height 6 to 12 inches, trailing; flowers pure white : May and June. Position cool, common soil. Division or seeds.

ASTER (Michaelmas Daisy or Starwort).—*A. alpinus* (Alpine); height 6 to 9 inches, compact; flowers bright purple : July. *A. altaicus*, *A. bessarubicus*, *A. Reevesi*, and *A. pyreneus* can be planted in roomy positions. Common soil. Division, in autumn or spring, and seeds.

AUBRIETIA (Purple Rock Cress).—A very popular family of rock plants. *A. deltoidea* (deltoid) and

its varieties, South of Europe; height 2 to 4 inches; flowers purple, violet and rose shades: early spring; fronts of rockworks and low walls. Deep loam. Layering and division after flowering, soft cuttings in handlights, and seed in April.

CALANDRINTIA.—*C. umbellata* (umbellated), Chili; height 6 inches; flowers bright magenta crimson: summer. Light sandy soil. Seeds in spring.

CAMPANULA (Bell Flower).—*C. alpina* (alpine), Europe; height 3 to 6 inches; flowers deep blue: July. *C. barbata* (bearded), European Alps; height 6 to 12 inches; flowers blue: June. *C. cespitosa* (tufted), temperate parts of Europe; height 4 to 6 inches, creeping; flowers deep blue. *C. alba*, pure white: May to June. *C. carpatica* (Carpathian), in variety; height 6 to 15 inches, dwarf; flowers blue shades and white: June to August. *C. cenisia* (Mont Cenis); a little gem; height 3 inches; flowers deep blue: June. Between stones in deep, gritty, loam and leaf soil. *C. fragilis*, South of Italy; height 4 to 6 inches; flowers lilac purple: July and August. *C. garganica* (Gargano), Italy; height 3 to 6 inches; flowers blue: May to September. *C. isophylla* (equal-leaved), Italy; trailing; flowers lilac blue, profuse: August. *C. i. alba*, good white form of preceding. *C. pulla* (russet), Eastern Europe; height 3 to 6 inches, tufted growth; flowers bluish violet; room to spread; sandy peat. *C. rotundifolia* (round-leaved), in variety, Britain; height 6 to 12 inches; flowers blue shades and white: summer. Except where otherwise advised, open positions. Rich, loamy soil. Division and cuttings in spring, and seed.

CERASTIUM (Mouse-eared Chickweed), *C. Biebersteini* (Bieberstein's), Caucasus.—Height, 6 inches; silvery-leaved, creeping; flowers white: early summer. Exposed margins; common soil; division and cuttings after flowering.

CYCLAMEN (Sowbread).—The hardiest are among the most beautiful rock plants. *C. coum* (Coum), South of Europe; height, 4 inches; small species; flowers deep red, rosy red, and white: March, or at the same time as the leaves appear. *C. europæum* (European). A species with tuberous root-stock; height 4 inches; flowers bright red: August to October. *C. hederifolium* (ivy-leaved), synonym *C. repandum* (repand); South Europe; height 4 to 6 inches; flowers various colours:

April and May. Position for the different species, sheltered from cold, drying winds and fierce sunshine; nooks at foot of rockwork; soil, brown, fibrous loam, leaf soil and well-decayed cow manure, finely sited. Plant tubers just below surface; increased by seed.

CYPRIPEDIUM (Lady's Slipper), *C. acaule* (stemless).—Northern United States; height 8 to 12 inches; flowers, sepals, and petals greenish, lip warm rose: May and June; should be planted in a fissure, where it can be kept somewhat dry in the winter. *C. candidum* (white), North America; height 12 inches. *C. calceolus* (common slipper),



Fig. 52. *DIANTHUS GLACIALIS*.

Northern Europe; height 12 to 18 inches; flowers reddish brown, lip pale yellow: summer; limestone mixed with soil. *C. guttatum* (spotted), Northern Russia and Siberia; height 9 inches; flowers pure white, blotched with deep, rosy purple: June. *C. spectabile* (showy), Northern United States; height 18 inches to 3 feet; flowers white and rose; require a somewhat shady position and peaty compost; increased by division.

DIANTHUS (Pink).—*D. alpestris* (rock).—Europe; height 6 to 9 inches; flowers red: June. *D. alpinus* (alpine), Austrian Alps; height 3 to 4 inches; flowers deep rose, spotted with crimson:

- July. *D. arenarius* (sand-loving), Northern Europe; height 6 inches; dense; flowers white: May and June; position dry and sunny. *D. barbatus* (bearded), common Sweet William, Southern Europe; heights and colours various: summer. *D. cæsius* (Cheddar pink); bluish grey, Britain; height 3 to 6 inches; flowers delicate rose: May and June. *D. cruentus* (bloody), Eastern Europe; height 18 inches to 2 feet; flowers blood red: summer. *D. deltoides* (deltoid), maiden pink, Britain; height 6 to 9 inches; flowers rose: summer. *D. dentatus* (toothed), Southern Russia; height 6 inches; flowers violet lilac: summer. *D. Fischeri* (Fischer's), Russia; height 3 to 4 inches; flowers rose: summer. *D. glacialis*, 4 inches; red: June (Fig. 52). *D. neglectus* (neglected), South of Europe; height 2 to 4 inches; flowers deep rose: summer. *D. petraeus* (rock), rock pink, Eastern Europe; height 6 inches; flowers rose: summer. *D. plumarius* (feathered), garden pink, Eastern Europe; height 9 to 12 inches; flowers white: summer; garden varieties also good for rockwork. *D. superbus* (superb), Europe and Asia; height 9 to 18 inches; flowers rose: summer. All can be grown in ordinary garden soil. Division, layering, cuttings, and seed.
- DICENTRA, or DIELYTRA** (Lyte Flower).—*D. eximia* (choice), United States; height 9 to 15 inches; flowers reddish purple: summer. *D. spectabilis* (showy), Japan; height 12 to 24 inches; flowers rosy crimson: spring and early summer; moderately rich soil; division of roots.
- DIOTIS** (Cotton weed).—*D. maritima* (sea), South of England and shores of Mediterranean; leaves woolly; height 6 to 12 inches; flowers yellow; fronts of rockery; cuttings or seed.
- DODECATHEON** (Cowslip).—*D. meadia*, North America; height 10 to 16 inches; flowers white, rosy purple, or lilac, with yellow anthers: April. *D. m. elegans* (elegant), *D. m. frigidum* (cold), *D. m. giganteum* (gigantic), *D. m. lancifolium* (lance-leaved), synonym *D. Jeffreyi* (Jeffreys), are all good varieties. Positions moist and sheltered; sandy peat, or leaf soil and loam. Division of the crowns in spring or autumn.
- DRABA** (Whitlow Grass).—*D. aizoides* (Aizoon-like), Europe; height 3 inches; flowers yellow: March. *D. aizoon* (Aizoon), mountains of Western Europe; height 5 inches; flowers bright yellow: April. *D. cinerara* (grey), Siberia; height 3 to 6 inches; flowers white: early spring. *D. cuspidata* (cuspidate), Spain; height 3 inches; flowers yellow: spring. *D. Mawi* (Maw's), Spain; height 3 inches; densely tufted; flowers white: spring. *D. tridentata* (three-toothed), Caucasus; height 3 inches; flowers yellow: August. Positions sunny, clear of other strong-growing plants; common garden soil, with limestone chips intermingled; division.
- DRYAS** (Mountain Avens).—*D. octopetala* (eight-petaled), Britain; creeping, evergreen; flowers white: June; moist peat soil; division, cuttings, or seed.
- ERIGERON** (Flea-Bane).—*E. Roylei* (Royle's), Himalayas; height 4 to 8 inches; flowers bluish purple: summer. *E. speciosus* (showy), also known as *Stenactis speciosa*, Western North America; height 18 inches; flowers violet and yellow: summer and autumn; positions moist and well-drained; common soil; division.
- ERINUS ALPINUS** (alpine), mountains of Western Europe; height 5 to 6 inches; tufted growth; flowers violet purple and pure white, profuse: March to June; fronts of rockwork, any soil; division.
- ERODIUM** (Heron's Bill).—*E. macradenium* (large glanded), Pyrenees; height 6 inches; flowers pale violet: June and July. *E. Manescavi* (Manescav's), Pyrenees; height 15 to 24 inches; flowers purplish red: summer. *E. Reichardi* (Reichard's), Majorca; height 2 to 3 inches; flowers white: April to September; positions dry; soil, sandy peat; division and seed.
- ERYTHRONIUM** (Dog's-tooth Violet).—*E. americanum* (American), North America; height 3 to 6 inches; flowers bright yellow: March and April. *E. dens-cauis* (Dog's tooth), Europe; height 6 inches; flowers purplish rose or whitish: spring. *E. grandiflorum* (large-flowered), North-west America; height 3 to 6 inches; flowers yellow or cream: March and April. *E. g. giganteum* (gigantic), Washington territory; flowers white: spring; positions, sheltered fronts; peaty soil; increased by offsets after the leaves die away.
- GENTIANA** (Gentian).—*G. acaulis* (stemless), Alps and Pyrenees; height 2 to 4 inches; flowers blue, with yellow marking: March to May; position, low; soil, strong, loamy; division and seed (see coloured plate). *G. Andrewsii* (Andrew's), North America; height 12 to 24 inches; flowers blue: August; position moist; soil loamy. *G. bavarica* (Bavarian), Central Europe; height 3 inches; flowers deep blue: July; position sunny; soil boggy, or a mixture of peat, sphagnum, moss, and broken limestone; division and seed.

G. pneumonanthe (Wind-flower), Britain; height 6 to 12 inches; flowers deep blue: August. *G. septemfida* (Crested Gentian), Persia; height 6 to 18 inches; flowers azure blue: June and July. Position moist; soil, sandy peat. *G. verna* (green), Britain; height 3 inches; dense; flowers blue, and blue shades: April and May. Position dry; soil sandy loam, with pieces of limestone freely added; fix firmly; division and seeds. All the Gentians are impatient of disturbance.

CERANIUM (Crane's-bill).—*G. cinereum* (grey), Pyrenees; height 6 inches; flowers pale red, with dark stripes. *G. argenteum* (silvery), Northern Italy; height 3 inches; flowers pale red: June and July. *G. cristatum* (crested), synonym. *G. albanum*, Tauria; height 12 inches; flowers purple: May. *G. lancastrisense*, Britain; height, 9 inches; striped: June. *G. sanguineum* (bloody), Britain; height 12 to 18 inches; flowers blood red: summer. *G. striatum* (streaked), South Europe; height 12 to 15 inches; flowers pink and veined: May to October. Positions dry, common garden soil; division and seed.

GYPHOPHILA REPENS (creeping), synonym. *G. prostrata*, Alps of Europe; height 6 inches; flowers white and pale rose: July to September. Position somewhat dry, soil loamy with mortar rubbish or limestone, chippings added; division, cuttings and seed.

HELIANTHEMUM (Sun Rose).—*H. formosum* (Fig. 53), also known as *Cistus formosus*, Portugal; height 4 feet; flowers yellow with black spot at base of petals: summer. Position dry, sheltered parts of rockwork; calcareous loam; cuttings and seed. *H. ocyroides* (Ocyrium-like), South Western Europe; height 1 foot to 3 feet; flowers white, yellow at the base: summer. Position warm and dry, sandy soil, cuttings and seeds. *H. tuberosaria*, synonym *globulariaefolium* (truffle sun rose), shores of the Mediterranean; forms large hairy leaves; height 9 inches; flowers citron yellow: summer. Position dry, fissure in the full sun, good soil. Division and seed. *H. vulgare* (common sun rose), Britain; height 6 to 9 inches; flowers yellow: spring and summer. There are several varieties, most of which can be raised from seed. Position rougher parts of rockeries, common soil.

HOUSTONIA CÆRULEA (Bluets), Virginia; height 3 to 4 inches; close growing; flowers light blue, sometimes white, abundant: early summer. Position sunny fronts, leaf soil and sand.

HUTCHINSLIA ALPINA (alpine), Central Europe; height 1 to 3 inches; flowers white: spring. Sunny exposed position, sandy soil; division and seeds.

IBERIS (Candytuft).—*I. corifolia* (coris-leaved), garden hybrid; height 1 foot; flowers white: May and June. *I. gibraltarica* (Gibraltar); height 1 foot to 2 feet; flowers white, suffused with pink or red: early spring. *I. Tenoreana* (Tenor's), South West Europe; height 6 inches; flowers purplish or whitish. *I. sempervirens* (evergreen), South Europe; height 9 to 12 inches; flowers pure white: spring and summer. Positions well exposed, ordinary garden soil. Cuttings, divisions and seeds.

IRIS (Flag).—*I. cristata* (crested), Eastern United States; height 6 inches; flowers pale blue, throat and crest deep yellow: April and May. Position



Fig. 53. HELIANTHEMUM FORMOSUM.

warm, open spots; rich light soil; off-sets and seeds. *I. nudicaulis* (naked stem), synonym. *I. biflora*, South Europe; height 4 to 5 inches; robust; flowers bright violet purple: April. Ordinary garden soil; division. *I. pumila* (dwarf), Europe; height 4 to 5 inches; flowers bright lilac purple: April. Position, flatter parts of rockwork; ordinary garden soil; division of rhizomes. *I. pumila lutea*, *alba*, *cærulea* and *atro-cærulea* are all good varieties. *I. reticulata* (netted), Southern Europe; height 3 to 6 inches; flowers brilliant purple: early spring. Position well-drained slope; sandy soil; division of tubers and seed.

LEONTOPODIUM (Lion's-foot).—*L. alpinum* (alpine),

synonym—*Gnaphalium Leontopodium* (Edelweiss), Alps of Europe; height 6 inches; white woolly leaves; flowers yellowish: June and July. Position exposed; firm, well-drained, sandy soil; division in spring, seeds.

LEUCOICUM (Snow-flake).—*L. æstivum* (summer), Central Europe; height 18 inches; flower pure white: spring and early summer. Common rich soil; division of bulbs. *L. vernum* (spring), Central Europe; 4 to 6 inches; flowers white: spring. Position sheltered; light rich soil.

LILIUM (Lily).—*L. concolor pulchellum* (one-coloured,



Fig. 54. *LITHOSPERMUM PROSTRATUM*.

pretty), Russian Lily. Mongolia; height 6 to 12 inches; flowers bright scarlet, spotted black: summer. Position partially shaded; peaty soil; offsets and seeds. *L. tenuifolium* (narrow-leaved), Siberia; height 6 to 12 inches; flowers bright scarlet: summer. Position warm and well-drained; sandy peat and loam; offsets and seeds.

LINARIA (Toad Flax).—*L. alpina* (alpine), Alps of Europe; height 6 inches; compact; flowers bluish violet, golden centre: summer and autumn. Position sunny; gritty soil. Seeds.

LINNÆA (Twin-flower).—*L. borealis* (northern), Britain;

trailing; evergreen; flowers flesh-coloured, fragrant: May and June; partial shade; moist, peaty soil. Division.

LINUM (Flax).—*L. alpinum* (alpine), Europe; height 6 inches; flowers blue. Position sunny and well drained; sandy loam and peat. Division in spring; cuttings and seeds. *L. arboreum* (tree-like) Crete; height 1 foot; flowers yellow: May and June. Position warm and sheltered; sandy loam and peat or leaf soil. Cuttings. *L. campanulatum* (bell-shaped flowered), South Europe; height 1 foot; flowers yellow: June to August. Position warm and dry slopes; soil sandy. Seeds. *L. narbonense* (Narbonne), Europe; height 15 to 20 inches; flowers blue, sometimes white: May to July. Position outer edge of rockwork; rich light soil. Division, cuttings and seeds. *L. perenne* (perennial), Europe, Britain; height 12 to 18 inches; flowers pale blue: June and July. Any position; common soil. Division, cuttings and seeds. *L. viscosum* (clammy), Europe; height 12 to 18 inches; flowers pale purple: June to August. Position sunny; soil well drained, moist sandy loam. Division, cuttings and seeds.

LITHOSPERMUM (Gromwell).—*L. canescens* (hoary), North America; height 6 to 15 inches; flowers yellow: June and July. Position well drained and sunny; sandy loam and leaf soil. Division, cuttings and seeds. *L. Gastoni* (Gaston's), Western Pyrenees; height 12 to 18 inches; flowers sky blue. Position sunny; rich loam. Divisions, cuttings and seeds. *L. prostratum* (Fig. 54), South Western Europe; trailing sub-shrub; flowers deep blue, striped with reddish violet: summer. Position sunny and well drained; rich light sandy soil. Cuttings of previous year's growth.

MYOSOTIS (Forget-me-not).—*M. alpestris* (alpine), synonym *M. rupicola*, Mountains of Europe, Britain; height 2 to 3 inches; flowers blue: summer. Sunny crevices in rockwork; common soil. Division, cuttings and seeds.

NARCISSUS (Daffodil).—*N. bulbocodium* (Hoop Petticoat); South-West Europe; height 4 to 8 inches; flowers bright yellow: April and May. Position sheltered slope; deep sandy loam. Offsets and seed. *N. juncifolius* (Rush-leaved), Spain and South France; height 4 to 6 inches; flowers bright yellow: April. Position sunny and sheltered; sandy soil. Division. *N. minor*, Spain; height 3 to 4 inches; flowers orange, yellow cup, pale sulphur division: March and April. Position sunny and exposed; fine sandy soil. Division of tufts. *N. cyclamineus* (cyclamen daffodil), yellow,

- N. triandrus* (angels' tears), white, *N. Johnstoni*, Queen of Spain, yellow, are charming forms suitable for rockwork, in damp shaded positions.
- NEREMBERGIA** (Cup-flower).—*N. rivularis* (brook-loving), La Plata; trailing; flowers white: July. Position shady and moist; loamy soil. Division.
- OMPHALODES VERNA** (spring).—South Europe; height 6 inches, creeping; flowers blue, with white throat: March to May. Position rough part of rockery; common soil. Runners or division.
- ONOSMA** (Golden Drop).—*O. tauricum* (Taurian); height 6 to 8 inches; flowers yellow: summer. Sunny position; sandy loam. Cuttings under glass in summer.
- OXALIS** (Wood Sorrel).—*O. Bowiei* (Bowie's), Cape of Good Hope; height 6 to 10 inches; flowers rose-red: August. Sunny slopes; sandy loam. Divisions. *O. floribunda* (bundle-flowered), synonym *O. rosea*, Chili; height 6 to 12 inches; flowers rose: spring. Fronts of rockery; common soil. Division and seeds.
- PAPAVER** (Poppy).—*P. alpinum* (alpine), Alps of Europe; height 6 inches; flowers yellow, rose-tinted, or white: summer. Position exposed; common soil. Division and seeds. *P. nudicaule* (naked stemmed), Iceland Poppy, Siberia; height 8 to 15 inches; flowers bright orange, yellow, or white: summer. Sunny position; common soil. Division and seeds.
- PHLOX**.—*P. divaricata* (spreading), North America; height 9 to 16 inches; flowers pale lilac or bluish: spring and early summer. Position sunny and open; good soil. Division. *P. nivalis* (snowy), South New York; trailing; flowers pink; and *subulata Nelsoni*, a hybrid form: April. Position where it can trail over rocks; common soil. Division.
- POTENTILLA** (Cinque-foil).—*P. alba* (white), European Alps; procumbent; flowers white: February to August. *P. alpestris* (mountain), Britain; height 6 to 12 inches; flowers bright yellow: July. *P. nitida* (shining), South of Europe; height 2 inches; flowers delicate rose: summer. *P. pyrenaica* (Pyrenean), Central and Southern Pyrenees; height 8 to 16 inches; flowers deep golden yellow: summer. All the species succeed well in cool open positions; common soil. Division.
- PRIMULA** (Primrose).—A large and popular family. *P. auricula* (common auricula), European Alps; height 3 to 4 inches; flowers various, normally yellow: spring. Position cool; sandy loam and leaf soil. Division and seeds. [See Alpine Auriculas.] *P. cortusoides* (cortusa-like), Siberia;

height 6 to 10 inches; flowers deep rose: early summer. *P. c. amœna* is a garden variety. Position sheltered, sunny nook; soil light and rich. Division and seeds. *P. denticulata* (toothed), Himalayas; height 8 to 12 inches; flowers bright lilac: spring and early summer. Position sheltered and sunny; deep rich loam. Division or seeds.



Fig. 55. PRIMULA SCOTICA.

P. erosa (bitter), Himalayas; height 4 to 8 inches; flowers lavender or purple: early spring. Position sunny and sheltered; sandy loam or leaf soil. Division and seeds. *P. farinosa* (mealy), Northern and Central Europe; height 3 to 10 inches; flowers light purple with yellow eye: early summer. Position cool and partially shaded; rich loam. Division and seed. *P. glutinosa* (glutinous), South Europe;

- height 4 inches; flowers brilliant purple: early summer. Sunny fronts; moist peaty or very sandy soil. Division and seeds. *P. integrifolia* (entire-leaved), Pyrenees and Switzerland; height 3 inches; flowers rose: spring and early summer. Exposed position; firm, strong soil. Division and seeds. *P. japonica* (Japanese), Japanese Primrose; height 12 to 18 inches; flowers crimson, maroon, lilac, rosy pink, or white: spring. Position sheltered and cool; deep rich loam. Division and seeds; germination slow. *P. marginata* (margined), Switzerland, height 2 to 4 inches; leaves with silvery margins; flowers violet, rose: April and May. Position open; light, loamy soil with bits of limestone rock about the plants. Division. *P. minima* (least), Fairy Primrose, South Europe; height 1½ inches; flowers rose, sometimes white: summer. Position clear open parts of rockwork. Firm sandy peat and loam. Division and seeds. *P. officinalis* (official), Cowslip, Britain; height 4 to 12 inches; flowers bright yellow: spring and summer. Position partially shaded and sheltered. Strong loam. Division and seed. The polyanthus is a variety of cowslip. *P. Parryi* (Parry's), Rocky Mountains; height 6 to 18 inches; flowers bright purple with yellow eye: spring. Cool and moist position; loamy soil. Division. *P. purpurea* (purple) is a fine form of *P. denticulata*. *P. scotica* (Scotch); height 2 to 4 inches; flowers rich purple, with yellowish eye: June. Cool position; loam and sandy peat (Fig. 55). Seeds. *P. Stuarti* (Stuart's), Northern India; height 9 to 18 inches; flowers rich golden yellow: summer. Position elevated and sheltered; light deep soil, and kept moist. Seeds. *P. viscosa* (clammy), Pyrenees; height 2 to 4 inches; flowers rose purple with white eye: summer. Any position; peaty or spongy loam with sand; must be kept moist. Division and seeds. *P. vulgaris* (Common Primrose), Britain; height 3 inches; colours various: spring. Any position; ordinary soil. Division and seeds.
- PYROLA** (Winter-green).—*P. rotundifolia* (round-leaved), Britain; height 6 inches; flowers pure white, fragrant: summer. Position partially shaded; loam and leaf soil. Division.
- RANUNCULUS** (Crowfoots).—A large family of many species suitable for rockwork. *R. aconitifolius* (aconite-leaved), Europe; height 6 inches to 2 feet; flowers white: May and June. Double-flowered best; position partially shaded; rich light soil. Division. *R. alpestris* (alpine), Pyrenees; height 3 to 6 inches; flowers white: June to August. Exposed positions; moist, sandy, or gritty soil. Division. *R. amplexicaulis* (stem-clasping), Pyrenees and Western Alps; height 3 to 9 inches; flowers pure white, seldom double: April and May. Prominent position; loamy soil. Division and seed. *R. glacialis* (glacier), mountains of Europe; height 3 to 6 inches; flowers white or reddish, suffused with purple, seldom double: June to August. Cool position; deep, gritty, peaty soil. Seed. *R. montanus* (mountain), Europe; height 6 inches; flowers yellow: May to July. Position sunny; moist sandy soil; division and seed. *R. rutefolius* (rue-leaved), Higher Alps; height 3 to 6 inches; flowers yellow: May to July. Position exposed to the sun; moist, sandy, or gritty soil. Division and seeds.
- SAGINA** (Pearl-weed).—*S. pilifera* (hair-bearing), Corsica; creeping; forms a green carpet; plant in patches. Seeds.
- SAPONARIA** (Soap-wort).—*S. ocyroides* (basil-like), Switzerland; trailing; flowers red or pink: August. Position, hottest parts of rockwork; common soil; cuttings and seeds.
- SAXIFRAGA** (Rockfoil).—*S. aizoides* (aizoon-like), Britain; dense-growing; tufted; flowers orange or golden yellow dotted with red: June and July. Position moist, ordinary soil. Division and seed. *S. aizoon*, Europe; height 5 to 10 inches; flowers cream colour: June. Position fully exposed; ordinary soil, division. *S. ceratophylla*, synonym *S. trifurcata* (thrice-forked), Spain; height 6 inches; flowers white: May. Position sunny; common soil. Division and seeds. *S. cordifolia pyramidalis* (heart-shaped leaves), Siberia; height 1 foot; flowers red: March to May. Any position or soil. Division. *S. cotyledon* (cotyledon), Alps; height 1 foot to 2 feet; flowers white: May to July. Position well exposed; common soil. Division. *S. C. pyramidalis*, a robust form of *S. cotyledon*. *S. diapiensoides* (diapiensia-like), Alps; height 1½ inches; flowers white: April to June. Sunny fronts; common soil; firm and well drained. Division. *S. granulata* (granulate), Britain; height 6 to 18 inches; flowers white: April and May. Position upper parts of rockwork; common soil. Division. *S. hypnoides* (hypnum-like), Dovedale Moss, Britain, tufts, forming large cushions; flowers white: May to July. Position sunny; deep moist soil. Division. *S. juniperina* (juniper-leaved), Caucasus, forms neat cushions; flowers greenish yellow: July. Sunny fronts; moist, sandy, firm soil. Division and seed. *S. longifolia* (long-leaved), Pyrenees, forms hand-

some silvery rosettes; height 1 foot; flowers white: July. Position between fissures in rocks; common soil. Seeds. *S. oppositifolia major* (opposite-leaved), Britain; height 6 to 8 inches; flowers bright purple: April and May. Exposed position; deep light loam; divisions. *S. Rocheliana* (Rochel's), Austria; height 3 inches; flowers white: summer. Position among crevices in rocks; loamy soil. Division and seeds. *S. sarmentosa* (sarmentose), Aaron's Beard, China and Japan; height 9 inches: June and July. Position where it can run wild; ordinary soil. *S. Wallacei* (syn. *S. compositi*), Spain; height 3 to 6 inches; flowers white: May.

SEDUM (Stone Crop).—An extra large family, the majority of which are admirably adapted for attractively clothing rockwork. Most of them have yellow flowers. Some of the best are: *S. acre* (bitter), *S. album* (white), *S. anacampseros*, *S. brevifolium* (short-leaved), *S. dasyphyllum* (thick-leaved), *S. glaucum* (glaucous), *S. kamschaticum*, *S. pulchellum* (pretty), *S. rupestre* (rock loving), *S. Sieboldi* (Siebold's), *S. spectabile* (remarkable), and *S. spurium* (spurious), synonym *S. stoloniferum*. Position, sunny trailing over rockwork; loamy soil, with stones mixed with it. Division.

SEMPERVIVUM (House Leek).—Of this family, again, there are a considerable number of species suitable for rockwork. Some of the best are: *S. arachnoideum* (cobwebby), *S. ciliatum* (ciliated), *S. montanum* (mountain), *S. triste* (sad), *S. tectorum* (roof-loving). Sunny positions; sandy soil. Division and seeds.

SELENE (Catch-fly).—*S. acaulis* (stemless), Britain; height 2 inches; flowers pink, sometimes white. *S. a. alba*, and red, *S. a. rubra*: June to August. Sunny slopes; peaty or sandy soil. Division. *S. alpestris* (alpine), Austrian Alps; height 6 inches; flowers white: May to July. Position sunny and exposed; deep moist loam. Division and seeds. *S. maritima* (maritime), Britain; height 2 to 4 inches; flowers white: June to August. There is also a double form—*S. m. flore pleno*. Fronts of rockery; common soil. Division and seeds. *S. pennsylvanica* (Pennsylvanian); height 4 to 8 inches; flowers pink: April to June. Position partially shaded; gravelly soil. Cuttings and seed. *S. pumilio* (Pigny Catch-fly), Tyrol;

very dwarf, compact; flowers rose-coloured: summer. Position sunny; sandy loam, surfaced with stones. Cuttings and seeds. *S. virginica* (Virginian Fire Pink); height 1 foot to 2 feet; flowers deep crimson: June to August. Position background; common soil. Division and seeds.

SOLDANELLA (Blue Moonwort).—*S. alpina* (alpine); height 3 inches; flowers violet: April. Position level; sandy soil. Division and seeds.



Fig. 56. WALDSTEINIA TRIFOLIA.

THALICTRUM (Meadow Rue).—*T. anemoneoides* (anemone like), North America; height 6 inches; flowers pinkish: early spring. Any position; common soil. Division of tuberous roots. *T. minus* (lesser), Britain; maidenhair-like foliage; flowers greenish yellow. Any position or soil. Division.

THYMUS (Thyme).—*T. lanuginosus* (woolly), a woolly form of the common British thyme. Succeeding well in dry, hot positions.

TRITELEIA (Triplet Lily).—*T. uniflora* (one-flowered), Buenos Ayres; height 6 to 12 inches; flowers pale

lilac : April and May. Exposed position ; common soil. Division of bulbs.

TROPEOLUM (Indian Cress).—*T. polyphyllum* (many leaved), South America ; trailing ; flowers yellow : June. Position sunny and dry ; common soil. Division of tubers.

TULIPA (Tulip).—*T. australis* (southern), Savoy ; height 6 to 12 inches ; flowers yellow, flushed with red : May. Any position ; soil sandy and well-drained ; division and seeds. *T. Clusiana* (Clusius), Lady tulip, South of Europe ; height 12 to 18 inches ; flowers white, flushed with red : July. Any sunny position ; common soil. Division and seeds.

VERONICA (Speedwell).—A large family, with blue or

white flowers. A few species are suitable for rock-work, notably, *V. chamædrys*, *V. prostrata* (prostrate), syn. *V. rupestris* ; *V. satureioides* (satureia-like), *V. saxatilis* (rock-loving), *V. taurica* (taurian) and *V. teucrium*. Any position ; common soil. Division and seed.

VESICARIA (Bladder-pod).—*V. utriculata* (bladder-podded), South Europe ; height 1 foot ; flower, yellow : April and June. Sunny and dry position ; loam and limestone chippings. Division and seeds.

WALDSTEINIA.—*W. trifolia* (three-leaved), Eastern Europe ; dwarf and spreading similarly to strawberries ; flowers golden yellow : April. Any position or soil (see Fig. 56).

SELECTIONS OF ROCK PLANTS.

Acena microphylla.
Acantholium glumaceum.
 **Achillea Claveana*.
 †**Alyssum saxatile*.
 †**Androsace villosa*.
Anemone blanda.
 **Antennaria tomentosa*.
 †**Arabis alpina*.
Arenaria balearica.
 †**Arenaria purpurescens*.
Asperula odorata.
Aster alpinus vars.
Aubretia purpurea.
 †**Aubretia Leichtlini*.
Campanula garganica.
 †**Campanula isophylla*.
Cyclamen coum vars.

Cyclamen hederæfolium vars.
Cypripedium calceolus.
Dianthus cæsius.
 †**Dianthus neglectus*.
Dodecatheon Meadia.
Draba aizoides.
 **Dryas octopetala*.
 **Erinus alpinus*.
Erodium macradenium.
 **Gentiana acaulis*.
Gentiana verna.
Geranium cinereum.
 **Hutchinsia alpina*.
 **Iberis sempervirens*.
Linaria alpina.
 **Lithospermum prostratum*.
Myosotis alpestris.

**Onosma tauricum*.
Papaver alpinum.
 †**Phlox Nelson's hybrids*.
 **Potentilla nitida*.
Primula auricula vars.
 **Primula integrifolia*.
Saponaria ocyroides vars.
Saxifraga cotedylon pyramidalis.
 †**Saxifraga longifolia*.
 †**Saxifraga oppositifolia major*.
 **Sedum Sieboldi*.
 **Sempervivum arachnoideum*.
 †**Silene acaulis* vars.
Soldanella alpina.
Veronica rupestris.
 †**Veronica saxatilis*.

* Twenty-five select species.

† Twelve select kinds.

For positions see preceding pages.

DESIRABLE PLANTS FOR ROCKWORK IN EXPOSED SITUATIONS.

(From the Journal of the Royal Horticultural Society.)

Acena:—*microphylla*, Nova Zeelandica.
Achillea tomentosa.
Androsace:—*carnea*, lanuginosa.
Anemone vernalis.
Arabis alpina.
Arenaria:—*balearica*, *crispitosa*, *grandiflora*.
Armeria:—*Lauchæana*, *maritima*.

Aster alpinus.
Aubretia:—*Leichtlini*, *purpurea*.
Calystegia pubescens.
Campanula:—*abietina*, *alba*, *alpina*, *marialis*, *nobilis*, *Portenschlagiana*, *pulla*, *pumila*, *turbinata*.
Cerastium tomentosum.
Cheiranthus alpinus.
Cistus:—*alyssoides*, *florentinus*.

Coronilla iberica.
Crucianella stylosa.
Daphne:—*Blagayana*, *Cneorum*, *rupestris*.
Dianthus:—*alpinus*, *caryophyllus*, *deltoides*, *neglectus*.
Draba aizoides.
Edraianthus dalmaticus.
Erinus alpinus.

Erododium Manescavi.	Loiseleuria procumbens.	Saponaria:—ocymoides, o. Loderi.
Genista tomentosa, fl. pl. triquetra.	Lysimachia nummularia.	Saxifraga:—azoides, aurantiaca,
Gentiana:—acaulis, verna.	Morisia hypogea.	ajugifolia Andrewsii, aretoides
Geranium:—cinereum, lancas-	Omphalodes Lucilia.	Boydii, Burseriana cerato-
Geum montanum. [triense.	Onosma taurica.	phylla, cotyledon, geum, hyp-
Globularia vulgaris.	Papaver alpinum.	noides, McNabiana, nepalense
Gnaphalium Leontopodium.	Pentstemon:—Menziesii, humile.	oppositifolia, retusa.
Gypsophila:—prostrata.	Petrocallis pyrenaica.	Sedum:—Acre, variegatum, Sie-
Helianthemum vars.	Phlox:—frondosa, Nelsoni, Nel-	boldi.
Hepaticas.	soni hybrids, setacea, s. atro-	Sempervivum californicum.
Heuchera sanguinea.	purpurea.	Silene:—maritima pl., pumila, ru-
Hieracium aurantiacum.	Phyteuma:—comosum orbiculare,	pestris, Shafta.
Hippocrepis comosa.	Scheuchzeri.	Thymus:—hirsutus, lanuginosus,
Hutchinsia alpina.	Polygonum vacciniifolium.	Serpyllum coccineum.
Iberis corifolia.	Potentilla nitida.	Tropeolum polyphyllum.
Iris reticulata.	Primula:—marginata, minima,	Veronica:—cupressoides prostrata,
Linaria:—alpina, Cymbalaria.	vulgaris.	rupestris.
Lithospermum:—prostratum, pet-	Ruta patavina.	Zauschneria californica.
reum, purpureo-cæruleum.	Salix lanata.	

DESIRABLE ROCK-PLANTS FOR SHELTERED POSITIONS.

Acantholium:—glumaceum, ve-	Cypripedium:—acaulis, calceolus,	Polemonium humile.
nustum.	pubescens, spectabile.	Polygala Chamæbuxus purpurea.
Alsine Rosani.	Dodecatheon Meadia.	Potentilla dubia.
Alyssum alpestre.	Edraianthus serpyllifolius.	Primula:—ciliata, c. purpurea,
Andromeda fastigiata.	Epilobium obovatum.	villosa, viscosa.
Androsace:—foliosa Laggeri, sar-	Erigeron aurantiacum.	Pyrola rotundifolia.
mentosa, villosa, Vitalliana.	Gentiana:—affinis cruciata.	Ramondia pyrenaica.
Andryala lyrata.	Geranium varieties.	Ranunculus:—alpinus, Lyalli.
Anemone:—apennina blanda, ful-	Globularia bellidifolia.	Saxifraga:—longifolia, mutata, op-
gens, Robinsoniana.	Glossocomia ovata.	positifolia major, pyramidalis.
Antennaria tomentosa.	Haberlea rhodopensis.	Sedum glaucum.
Arenaria cespitosa aurea.	Hedysarum varieties.	Sempervivum:—arachnoideum,
Arnebia echioides.	Hepatica angulosa.	triste.
Asperula odorata.	Hyoscyamus orientalis.	Shortia galacifolia.
Astragalus alpinus.	Linnea borealis.	Silene:—acaulis alba, a. rubra
Aubrieta Hendersoni.	Linum flavum.	alpestris.
Bellium bellidoides.	Lumaria pallida.	Soldanella:—alpina, montana.
Campanula:—fragilis, garganica	Myosotis:—alpestris, rupicola.	Spergula aurea.
pulla, Waldensteniana.	Opuntia Rafinesquiana.	Trifolium uniflorum.
Cyananthus lobatus.	Phlox:—ovata, the Bride, Vivid.	Tropeolum polyphyllum.
Cyclamen:—Atkinsi alba, and	Plumbago Larpentæ.	Veronica saxatilis.
repandum.		

EVERGREENS FOR ROCKWORK.

Bambusas in variety.	Euomyzus radicans variegata.	Hedera helix conglomerata.
Buxus arborescens in variety.	Hedera arborea in variety.	„ helix minima.

EVERGREEN FLOWERING SHRUBS FOR ROCKWORK.

Andromeda japonica.	Cistus laurifolius.	Olearia Haasti.
Azalea amena.	Cotoneaster microphylla.	Pernettyas in variety.
" rosaeiflora.	" thymifolia.	Rhododendron arbutifolium.
Berberis dulcis nana.	Daphne Cneorum.	" chamecistus.
" empetrifolia.	" rupestris.	" hirsutum.
Bryanthus erecta.	Diplopappus chrysophyllus.	" myrtifolium.
Choisya ternata.	Erica carnea and other Heaths.	Vaccinium Vitis-Idæa.
Cistus ladaniferus.	Ledum Lyoni.	Veronicas (New Zealand Shrubby).

DECIDUOUS FLOWERING SHRUBS FOR ROCKWORK.

Cratægus Lelandi.	Kœlreuteria paniculata.	Rosa pyrenaica.
Cytisus Ardouei.	Philadelphus microphyllus.	" rugosa.
" purpureus.	Polygonum compactum.	" " alba.
Deutzia gracilis.	Pyrus (Cydonia) Maulei.	" spinosissima.
Fuchsia pumila.	" nivalis.	Rubus deliciosus.
Genista hispanica.	Rhus cotinus atropurpurea.	" spectabilis.
" precox.	Ribes alpinum.	Spiræa, dwarf shrubby species.
Hypericum patulum.	Rosa alpina.	

CONIFERS FOR ROCKWORK.

Biota orientalis aurea.	Juniperus procumbens.	Taxus baccata pygmæa.
" elegantissima.	" sabina variegata.	" " aurea.
Cupressus Lawsoniana nana.	Picea excelsa Clanbrasiliana.	" " elegantissima.
" Nutkaensis compacta.	" " " pygmæa.	" " ericoides.
Cryptomeria elegans nana.	Retinospora ericoides.	Thuia occidentalis Elwangeriana.
" japonica nana.	" leptoclada	Thuiopsis dolabrata.
Juniperus hemisphærica.	" obtusa aurea nana.	" " variegata.
" chinensis aurea.	" " plumosa aurea.	" " letevirens.
" echiniformis.	" " " alba	
" communis compressa.	" " " picta.	

THE HARDY FERNERY.

There can be no two opinions as to the popularity of hardy ferns: a well-arranged fernery rarely fails to give pleasure to all beholders. Ferns when judiciously planted are never out of place. Whether grown in mixed borders, grouped in bold masses alongside walks, on mounds in shady corners, on the sides of an entrance porch, or collected together in a fernery, they add to the charm of a garden, and convey an impression of freshness, coolness, and gracefulness not imparted by any other class of plants. The majority of ferns succeed well in town and suburban gardens, and no-

where are they more fully appreciated, affording as they do such a welcome contrast to, and change from, the more glaring beds and borders. Most hardy ferns like partial shade, and no better plants can be found for growing in nooks and dells screened from the sun, and they also afford elegant fringes to water courses.

If rockwork is designed on a large scale, it will be suitable for ferns in the more shaded parts, and these will form a pleasing foil to the flowers in sunny positions. There is, however, no necessity to construct elaborate rockwork solely with a view to growing ferns. If they succeed in such positions they quickly hide the stones. Too much thought is often given to the appearance of rockwork, and not enough to the future welfare of the plants that are to occupy what little room is provided for them, and it is painful to see so many suffering from heat above and drought below. A semi-shaded position in a rock-garden (see page 92) suits ferns admirably. Due regard ought also to be paid to the requirements of the different kinds. Those that thrive in special mixtures ought to have them, and care should be taken to guard against choice species of neat growth being overgrown by those of a bolder habit. Some idea of what the different kinds require will be gathered from the brief descriptions appended of the most popular hardy ferns.

Before giving these, reference ought to be made to the manner in which some species adapt themselves to appropriate positions. In most districts ferns can be seen growing healthily on walls and natural rocks, with nothing to root in but the small quantity of soil in the crevices. When, therefore, walls of loose stone are formed, layers of soil between the stones would support a few ferns, if these were planted when in a small state early in the spring, taking care not to bury the hearts. For shady places the parsley fern (*Allosorus crispus*), the wall rue (*Asplenium ruta-muraria*), the black spleenwort (*Asplenium adiantum nigrum*), maiden-hair spleenwort (*Asplenium trichomanes*), and the hard fern (*Blechnum spicant*) are recommended; while for the more sunny aspects the scale fern (*Ceterach officinarum*), the common scolopendrium (*S. vulgare*), the common polypody (*P. vulgare*), and *Nothochlæna marantæ* are suitable.

Then there are kinds that succeed admirably in moist, well-drained positions, to be referred to in the chapter on Water Scenes; but mention must here be made of the native filmy ferns. These are *Hymenophyllum unilaterale* or *Wilsoni*, *Hymenophyllum tunbridgensis*, and the Killarney fern (*Trichomanes radicans*). They are perfectly hardy, but will not thrive where there is either little moisture in the atmosphere, or if

they are dry at the roots. They must have a damp, sheltered and shady position, a niche in the rockwork about a dripping waterfall, where the spray dews them over frequently, answering well. The soil that suits them is a mixture of peat and sandstone in lumps, kept sweet by ample drainage.

For open positions, including mixed flower borders, the most reliable and effective are the male fern (*Lastrea filix-mas*) in variety, the lady fern (*Athyrium filix-fœmina*) in variety, the spring buckler fern (*Lastrea spinulosa*), the bracken fern (*Pteris aquilina*), and the common scolopendrium. These will all thrive in ordinary garden soil, but during the growing season ought to be kept in a thoroughly moist state at the roots.

NOTEWORTHY BRITISH FERNS.

ALLOSORUS CRISPUS (Parsley Fern).—Deciduous; attains a height of 6 to 9 inches, and succeeds best in a dry, stony situation.

ASPLENIUM (Spleenwort).—*A. adiantum nigrum* (Black Spleenwort) in variety; height 6 to 12 inches. Should have sandstone freely mixed with loamy soil. *A. ruta-muraria* (wall rue), *A. trichomanes* and *A. viride*, all growing about 6 inches high, are evergreen, and ought to have a mixture of loam and leaf soil.

ATHYRIUM.—*A. filix-fœmina* (Lady Fern) in variety. These are among the best of hardy deciduous ferns; height 1 to 1½ feet; sheltered, moist position; loam and leaf soil.

BLECHNUM SPICANT (Hard Fern), of which there are six or more varieties; evergreen; height 6 to 12 inches; exposed position; loam and peat.

CETERACH OFFICINARUM.—Syn. *Asplenium officinarum* (Scaly Spleenwort); evergreen; height 4 inches; crevices in rockwork; loam, lime rubbish and rock chippings.

CYSTOPTERIS (Brittle Fern).—*C. fragilis* and forms of it are deciduous, also *C. montana*; height 6 inches. Succeed in a shady position and a dry, stony bottom; sandy peat and loam, with stones freely intermingled.

LASTREA.—*L. filix-mas* (Male Fern) in variety; free-growing hardy ferns, and nearly evergreen; height 2 to 3 feet; ordinary soil or strong loam and leaf mould. *L. semula* (hay-scented buckler fern), evergreen; height 9 to 12 inches. Shady position; loam and leaf soil. *L. dilatata*, in variety; 1 to 3

feet; nearly evergreen; partial shade and rich loamy soil. *L. montana*, 2 to 3 feet, and *L. thelypteris*, 1 to 2 feet, both deciduous, ought to have a cool, moist position, and loamy soil.

OSMUNDA.—*O. regalis* (Royal Fern) is the best-known species in this family, and attains a height of 3 to 4 feet. Loam, peat, and river sand, with abundance of moisture during the growing period.

POLYPODIUM (Polypody).—A large genus, comprising many popular species. *P. alpestris*, 2 to 3 feet, and *P. a. flexile*, 12 to 18 inches, are deciduous, thriving in cool, moist, sheltered positions; loam and leaf soil. *P. dryopteris* (oak fern), 6 to 9 inches; *P. Robertianum*, 9 to 12 inches; and *P. phegopteris* (beech fern), 9 to 12 inches, also deciduous, and should have cool, shady, moderately moist positions; loam and leaf soil. *P. vulgare*, in variety, 9 to 18 inches; delights in dry positions; strong loam and leaf soil.

POLYSTICHUM (Shield Fern).—Another popular family. *P. aculeatum*, in variety, 2 to 2½ feet; and *P. angulare*, in variety, 15 inches to 2 feet, are evergreen, and should have a moderate amount of shade, a dry, stony bottom, and a rich loamy soil.

PTERIS AQUILINA (Common Bracken).—2 to 4 feet; any position where there is room to spread; common soil.

SCOLOPENDRIUM (Hart's Tongue).—*S. vulgare*, in great variety, including numerous crested forms, are all evergreen, and succeed in dry positions; strong loam and leaf soil.

HARDY EXOTIC FERNS.

ADIANTUM.—A. pedatum, from North Hindostan, a beautiful deciduous species; height 12 to 24 inches; succeeding in dry, stony situations; protect in the spring. A. venustum, Himalayas; 6 to 12 inches; sheltered position; loam and peat, with good drainage.

ASPLENIUM ANGUSTIFOLIUM, Canada.—18 to 24 inches. To be planted where slight protection can be afforded; loam and sand.

ATHYRIUM FILIX - FEMINA AMERICANUM, North America.—2 feet; sheltered position; loam and leaf soil.

BOTRYCHIUM VIRGINIANUM (Virginian Moonwort).—4 to 12 inches; position well drained; sandy loam.

CYRTOMIUM FALCATUM, Polynesian Islands.—6 to 18 inches; moderately hardy; loam, peat, or leaf soil and sand.

CYSTOPTERIS BULBIFERA (Bulb-bearing Bladder Fern), North America.—6 to 12 inches; sheltered position; peaty soil.

DEMASTOEDTIA PUNCTILOBA.—An attractive species; 2 feet; loam, leaf soil, peat and sand.

LASTREA.—L. decurrens, from Tropical Asia; 2 to 4 feet; must also be lightly protected in the winter. L. fragrans, Caucasus; 6 to 9 inches; quite hardy, and succeeds in peaty soil. L. Sieboldi; 6 to 12 inches; Japanese species. Should have slight protection; loam, leaf soil, or peat and sand.

LOMARIA.—L. alpina, Brazil; 4 to 8 inches; moderately hardy; enjoys a well-drained position and mixture of loam and peat. L. Germaini, Chili; bears a strong resemblance to L. alpina, and requires similar treatment.

LYGODIUM PALMATUM, United States of America.—Climbing 2 to 3 feet; peat, loam, and sand.

ONOCLEA.—A small family allied to the Struthiopteris. O. sensibilis, North America; a noble species; height 2 feet; shady position; strong loamy soil.

OSMUNDA (Flowering Ferns).—O. cinnamomea, Canada and Japan, 2 to 3 feet; and O. Claytoniana, North America and Himalayas, 1 to 2 feet. Succeed in somewhat moist positions, and a mixture of fibrous loam, peat and sand.

PLATYLOMA ROTUNDIFOLIA, New Zealand.—6 to 12 inches; sheltered position; loam, peat, or leaf soil and sand.

POLYSTICHUM.—P. acrostichoides, North America; 1 to 2 feet; position exposed; peaty soil, with sandstone added. P. munitum, California; 1 to 2 feet; perfectly hardy; should have plenty of room and a loamy soil.

PTERIS SCABERULA, New Zealand.—12 to 18 inches; slight protection needed; peaty soil.

STRUTHIOPTERIS.—S. germanica, Northern Hemisphere, 2 feet. S. orientalis, Japan, 2 feet; and S. pennsylvanica (Ostrich Fern), 2 to 3 feet. All hardy, strong - growing and popular; open or shaded position, and strong loamy soil.

WOODWARDIA (Chain Fern).—W. areolata, United States; 9 to 12 inches; slight protection; light, rich soil. W. radicans, South Europe; 3 to 6 feet; requires raised position, good room, and light, rich soil; partial protection advisable.

WOODSIA ILVENSIS, Island of Elba.—6 inches. Open position; loam, leaf soil, sand, and lumps of sandstone.

FIFTY GOOD HARDY FERNS.

+* Adiantum pedatum.
 * Allosorus crispus.
 Asplenium adiantum nigrum.
 " ruta-muraria.
 +* " angustifolium.
 " trichomanes.
 * Athyrium filix femina.
 +* " f.f. Victoriae.
 " f.f. grandiceps.
 * " f.f. plumosum.
 * Blechnum spicant.
 Ceterach officinarum.
 Cyrtomium falcatum.
 Cystopteris bulbifera.
 +* " montana.
 Hymenophyllum tunbridgensis.
 " unilaterale.

Lastrea æmula.
 " dilatata.
 +* " " grandiceps.
 * " filix-mas.
 +* " " grandiceps.
 " ramosissimus.
 * " decurrens.
 " Sieboldi.
 * Lomaria alpina.
 +* Onoclea sensibilis.
 Osmunda cinnamomeana.
 " gracilis.
 +* " regalis.
 * " " cristata.
 * Polypodium dryopteris.
 * " phegopteris.
 " vulgare.

Polypodium vulgare cambricum.
 +* " " grandiceps.
 Polystichum acrostichoides.
 * " aculeatum.
 +* " angulare grandiceps.
 " " laxum.
 * " " plumosum.
 Pteris aquilina cristata.
 Scolopendrium vulgare.
 " " crispum.
 +* " " cristatum.
 " " multifido
 [cristatum].
 +* Struthiopteris germanica.
 * " pennsylvanica.
 Woodsia alpina.
 Woodwardia areolata.

* Twenty-five select Ferns. + Twelve select Ferns.

WATER SCENES, CASCADES, AND FOUNTAINS.

A large expanse of water worthy of being termed a lake, is a great feature in the landscape, and affords welcome opportunities for recreation and enjoyment. In some instances, thanks to the natural conformation of the sites and the holding nature of the sub-soil, lakes or large ponds have been formed without much labour or expense, but in the majority of cases they prove luxuries more or less costly; not in formation only, but subsequently, in consequence of leakages, mud, and weeds, all of which have to be reckoned with. Where large areas of water are desired, engineers or others having had experience in this kind of work should be employed to form them.

Smaller sheets of water are sometimes introduced with excellent effect in pleasure-grounds, though also, it must be added, serious mistakes are not infrequently made in providing them. So-called ponds that can only be kept filled with water at seasons of the year when least appreciated are worse than disappointing, as they may be stagnant and offensive in the summer, the very time when a full and clear supply is appreciated. Drains from higher ground cannot always be depended on, though a strong spring might be turned to account in feeding a small pond, with a steady outlet for keeping the water pure. Still more to be desired are running streams, as with their aid sheets of water can be easily formed and beautiful effects produced (see page 114.)

The question to be decided by those who own or have to deal with natural streams of water, is whether or not anything would be gained by constructing a pond. Occasionally it would, perhaps, be more satisfactory to concentrate attention on the beautification of the stream, adding rockwork in some places, and planting bold masses of the stronger-growing, moisture-loving ferns, including osmundas, lastreas, athyriums, and struthiopterises, with Flowering Rushes (*Butomus umbellatus*), Water Plantains (*Alisma plantago*), Water Arums (*Calla palustris*), Water Irises, also epilobiums, sedges, and similarly appropriate plants in other positions. It is possible, when a stream runs through the lower parts of pleasure-grounds, to have both effects; that is to say, a delightful brook widening into a miniature lake. Streamlets may also, sometimes, be diverted from an adjacent river, and cascades formed with its aid, as in the case of Mr. A. H. Smee's interesting garden at Carshalton, Surrey.

Whether the course of a brook is changed, or a streamlet diverted from a river, everything possible should be done to make the effect appear natural and the work durable. The stream ought to be neither straight, nor, if there is a heavy rush of

water at times, very winding or crooked. Abrupt curves are never found in rapid water-courses for the simple reason that they are washed away; but in the case of gentle streams more curves may be allowed with advantage. The width of streams ought not to vary greatly other than at the bends, where they naturally widen from the action of water, unless prevented by masses of rock. If fish are to be cultivated then these bends may be deepened and the curves planted with overhanging deciduous trees such as willows, alders, and birches. The depth of an artificial stream must be determined by circumstances. If there is likely to be a heavy volume of water at times, allowance must be made for this, and a depth of 4 or 5 feet may not be too much; while if there is a decided fall towards the point intended to be widened into a pond, provision should be made for breaking the fall.

Having decided upon the course to be followed, stake it out fully 2 feet wider than it is to be left at the finish, allowing the extra width for filling in with concrete or puddle, and either rockwork or soil. Give the sides a gentle slope and make the bottom perfectly smooth and fairly level. It has been

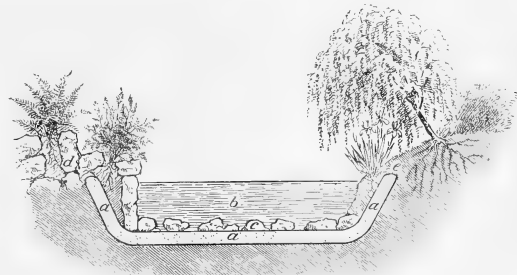


Fig. 57. ARTIFICIAL WATER-COURSE.

a, concrete or puddle; *b*, water; *c*, banks with iris and willow;
d, rocks and ferns.

premised that few of the sites of artificial streams or ponds are sufficiently retentive for the purpose of holding water and must be made so, or disappointment will result. On a large scale, a solid bed of puddled clay is the cheapest material for the purpose; strong plastic clay free from gravel or sand must be used, and in some districts a depth of 6 feet or more of this can be found not far below the surface. Sliced, watered, and pounded till it becomes of the consistency of clay that is moulded into bricks or pottery, it can be applied in layers and heavily pounded with ordinary rammers, till the bottom is 1 foot and the sides are 18 inches in thickness.

Concrete made of either one part of Portland cement to five parts of broken stones and sand, or one part of hydraulic lime to four parts of stone and sand, though more costly than clay, is the more durable and better in the end. It should be spread to a

thickness of 4 to 5 inches over the bottom, and against the sides to a height of 9 to 12 inches (see Fig. 57). Where the sides are loose and weak a sloping cemented brick wall must be made. Both the bottom and sides ought to be faced over to a thickness of 1 inch with a mixture of equal parts of cement and fine sand, and if the work is done well there will be no escape of water in any direction. Cover the bottom with stones or pebbles, and mask the sides much as shown in the Fig., page 113. Unless this is done the concrete wall and bottom left exposed would represent a mere water trough and be the reverse of attractive. Those delightfully cool glades and charming water scenes

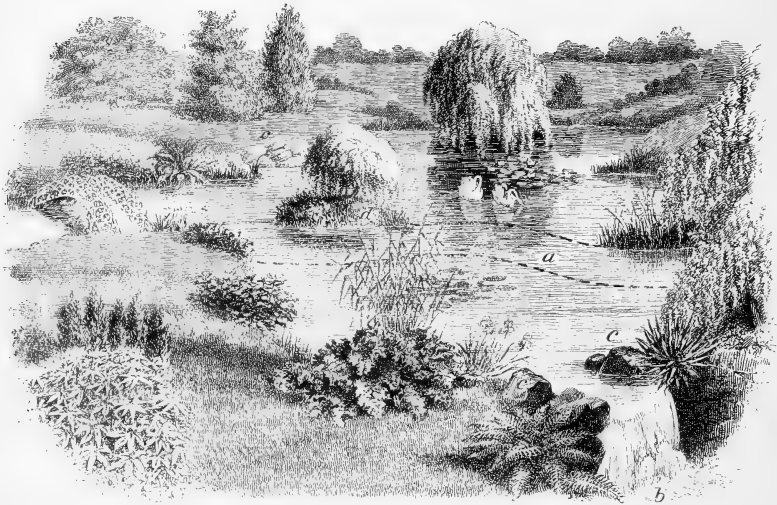


Fig. 58. MINIATURE LAKE.

a, original water-course; *b*, cascade; *c, c*, rocks; *d*, island.

to be met with in various old-established pleasure grounds are the work of years, and imitators of them should remember that forest trees ought not to be planted nearer than 9 feet from an artificially formed stream or sheet of water, or the time will come when the roots will upheave and crack the concrete or puddle and cause the water to escape.

Miniature lakes or ponds may need embankments in some positions, but only at one end or side. In the illustration of a water scene (Fig. 58), the pond has been obtained by merely enlarging the original water-course and banking up at the lower end, this

affording a good opportunity for constructing a small waterfall, partly shown at *b*. In this case a depth of 5 feet in the centre, with a gentle rise to the sides, where there ought to be 3 feet of water, was arranged for; and these figures apply generally. If shallower than this, too much water is lost by rapid evaporation on hot sunny days. Sloping banks should be formed and the turf, where possible, reach down to the water. Avoid following the exact outline of a lake or stream with a path, as such an arrangement is too formal to be pleasing. Where rocks have been bared (*c, c*) or grouped they should be cemented or water may escape.

What to do with the soil excavated in forming a large pond is often a problem difficult to solve satisfactorily, as only that taken from the surface is fit for planting in, and the rest must not be banked up against trees or it will kill them; nor disposed where it will be a disfigurement to the locality. If an embankment is necessary, use the portions free from stones or gravel, forming a wide, easy slope, surfacing this over with a foot or more of good soil for planting with trees or shrubs.

Provision ought always to be made for emptying a pond or lake other than by the ordinary outlet, as this is only intended for the overflow or the escape of surplus water. A sluice gate, made of stout oak boards fitted in a grooved frame, with an apparatus for raising and lowering it at will, can be fixed at some convenient spot for drawing off the water. These sluice gates should have an iron grating or strainer to prevent fish being carried away.

Islands in the middle of a sheet of water are altogether a mistake, quite disfiguring it. If they must be had, and they are a feature in some cases, a suitable position for them is shown in the design (*d*), or they may be at the opposite end. Aquatic plants suitable for these, and various positions, will be duly set forth in the succeeding chapter.

CASCADES AND WATERFALLS.

Cascades or waterfalls on a small scale can be formed, as already shown, always provided they are raised 3 to 6 feet or more above the ordinary ground level; but by far the most beautiful effects are produced when pure glistening water from a spring can have a much greater, yet broken, fall to a depth of 20 feet. If there is not sufficient water to constantly feed the cascade, provision can be made for storing it in a concreted reservoir, the overflow trickling down the rockwork. The reservoir supply to be liberated by means of a valve whenever an immediate grand effect is desired.

Cascades to be broken up should, in every case, have a solid, water-holding foundation. First form the outline, or a series of steps made as firm as possible, casing this over with concrete; which, however, ought not to show after the work is completed, but all should be hidden by stones in a variety of sizes, set horizontally in cement, in rough imitation of stratified rocks, finishing above the point where the water commences to flow. Pockets or deep crevices not watertight should be formed for holding soil in which to plant a variety of ferns and rock plants of a moisture-loving nature. Without this judicious arrangement of plants, the general effect would be far from satisfactory.

FOUNTAINS.

This is not an age of bricks and mortar, so far as gardens are concerned, it is the clear expanse of lawns and more natural surroundings that are most preferred. Fountains, however, are still to be met with—more especially in town and suburban gardens—where the one thing needful, a good supply of water at a considerable height above the ground, is well within the reach of all who have the water laid on. With a galvanised iron tank at the top of the house, fed by means of a pipe and ball-cock, and another service of pipe connecting it with the fountain, a good force of water can be brought into play. Whether a few or many jets be used must depend upon the taste of those having the fountain constructed, and it is a good plan to have a rough trial before completing the work.

Those very grand fountains at the Crystal Palace, Chatsworth, Witley Court, and elsewhere, are fed by large reservoirs at a much greater altitude than where the display is made. Water merely spurting out of jets, owing to insufficiency of pressure, is far from attractive, and it is better to dispense with fountains altogether than have such puerile attempts. A basin usually surrounds fountains for holding some of the water that falls. Seeing that aquatic plants are grown and fish usually kept in the basins, the water cannot all be drawn off in the winter, and the masonry must, therefore, be made frost proof. Instead of cementing the brickwork, this not resisting the action of frost, line it with concrete, a foot thick at the bottom, tapering to a thin portion where the kerb is reached, this allowing room for expansion when ice is formed. The position of the pipes conveying the water to the fountain and the overflow from the basin must be decided upon and the pipes fixed before the concreting is completed.

AQUATIC AND BOG PLANTS.

It is questionable if the majority of either professional or amateur gardeners are sufficiently familiar with aquatic and bog plants. If they realised what delightful resorts could be created with their aid, these moisture-loving plants would receive much more attention than is at present accorded them. Ponds, pools, and tanks may be utilised in the culture of aquatics, and with the aid of the overflow from them, or a supply of water from some other source, beds of peat could be kept sufficiently moist to support a great variety of bog plants. At present the only aquatics we see in the majority of lakes, ponds, or pools are either the common water lily (*Nuphar lutea*) or the more beautiful white water lily (*Nymphæa alba*). The first named often spreads to such an extent as to become a nuisance, while it is possible to have even too much of the water lily. If, therefore, a collection of aquatics is formed, the coarser kinds must not be allowed to overgrow their more delicate neighbours.

The new hybrid Water Lilies raised by M. Latour-Marliac are very beautiful and great acquisitions to a lake, pond, or even a pool or tank. They are perfectly hardy in our climate, and some of them, such as the deep yellow chromatella, increase as rapidly as our native *N. alba*. The bright rose-coloured *N. Laydekeri rosea* does not increase quickly, and with *N. pygmæa* and *N. p. helvola* may be grown in a small pool or tank without encroaching upon others.

Strong growing aquatics, such as the water plantain (*Alisma plantago*), the mare's tail (*Hippuris vulgaris*), nuphars, nymphæas, sagittarias, and *Villarsia nymphæoides* (Thames lily), ought to have a depth of from 3 to 5 feet of water, and the planting should be done early in the spring. Those kinds may be planted in coarser soil in halves of petroleum barrels duly burnt out, or even in flat hampers; the less vigorous, that will be named, in old butter tubs, market gardener's baskets, or receptacles made with galvanised wire netting. That method is the most desirable when the pond is concreted, and if any of the receptacles prove unsightly owing to the clearness of water, stones or burrs can be packed against them, fish approving of this arrangement. For ordinary ponds, the simplest plan is to enclose the roots and soil in old mats or sacking and sink them. In the course of time the material decays and the plants generally spread freely.

For the shallower water of running brooks and the sides of ponds, the water plantain, the Cape pondweed or water hawthorn (*Aponogeton distachyon*), flowering rush (*Butomus umbellatus*), sedge (*Carex paniculata*), sweet cyperus (*Cyperus longus*),

marsh marigold (*Caltha palustris*), bog bean (*Menyanthes trifoliata*), water dock (*Rumex hydrolapathum*), bulrush (*Typha latifolia*), water irises and the like, are all suitable. These ought to be arranged in groups rather than in a general mixture. Not only are they most effective in masses, but unless kept well apart, the robust will soon destroy the weaker kinds.

What are known as bog plants are those that will neither thrive in water nor in dry ground. They require to be planted in a mixture of black peat, leaf soil, and other decaying vegetable matter constantly moist, yet not submerged. Many interesting, and to a certain extent beautiful plants, luxuriate under those conditions, and the wonder is that so few owners of gardens where a collection of bog plants might be formed, have so neglected their opportunities; all they need are water-holding beds, which may be in the form of terraces on a slope, or on a level with a brook or ditch of running water.

The sides and base of the beds should be either concreted or bricked and cemented. A depth of 12 inches suffices, and this may be nearly half filled with stones covered with 6 inches or rather more of black peat and leaf soil, some of this being formed into ridges with stones. There must be an outlet for the water, which may be returned to the stream from whence it is drawn, or be run into the lower beds and from thence to a pool formed for the true aquatics. Moisture will rise to the surface of the beds and keep the peat constantly moist. The ridges and crevices between the stones are the best positions for those kinds of plants requiring the least moisture, such as *osmundas* in variety, *Struthiopteris pennsylvanica*, *Onoclea sensibilis*, *Cypripedium spectabile*, *dodecatheons*, *Dielytra spectabilis*, *dryas*, *pinguiculas*, *sarracencias*, various *primulas* and *Iris fulva*. *Rhododendrons*, *kalmias*, *andromedas*, and *bambusas*, are also well adapted for planting in the higher drier parts of the bog garden.

The appended list of aquatic and bog plants should be of service in showing what may be grown in the various positions indicated.

DEEP-WATER PLANTS.

Alisma plantago.	<i>Nymphæa caroliniana nivea.</i>	<i>Nymphæa pygmæa helvola.</i>
Aponogeton distachyon.	" <i>Laydekeri liliacea.</i>	(Also in shallow water)
Hippuris vulgaris.	" " <i>purpurea.</i>	" <i>tuberosa.</i>
Nuphar advena.	" " <i>rosea.</i>	<i>Sagittaria montevidiensis.</i>
" <i>lutea.</i>	" <i>Marliacea alba.</i>	" <i>sagittifolia.</i>
" <i>minor.</i>	" " <i>chromatella.</i>	" " <i>plena.</i>
<i>Nymphæa alba.</i>	" <i>odorata sulphurea.</i>	<i>Villarsia nymphæoides.</i>
" <i>candida.</i>	" <i>pygmæa.</i>	

SHALLOW-WATER PLANTS.

Alisma plantago.	Caltha palustris.	Lythrum roseum superbum.
Aponogeton distachyon.	Carex paniculatus.	Menyanthes trifoliata.
Butomus umbellatus.	Cyperus longus.	Ranunculus lingua grandiflora.
Caladium virginicum.	" vegetus.	Rumex hydrolapathum.
Calla palustris.	Hottonia palustris.	Typha latifolia.

BOG PLANTS.

Acorus gramineus.	Juncus zebriinus.	Ranunculus lingua.
Arundo donax.	" spiralis.	Rodgersia podophylla.
Arundinarias in variety.	Lastrea Thalictrum.	Sarracenia Drummondii.
Asarum cordatum.	Lilium canadensis.	" purpurea.
" Hartwegi.	" carolinianum.	Saxifraga Hirculus.
Bambusas in variety.	" pardalinum.	" peltata.
Caltha intermedia.	" superbum.	Scrophularia nodosa variegata.
" monstrosa plena.	Lobelia syphilitica.	Senecio pulcher.
" nana "	Lychnis flos-cuculi alba.	" retusa.
" palustris "	" " plena.	Sium latifolium.
Carex acuta variegata.	Lysimachia clethroides.	Spiræa Aruncus.
Claytonia sibirica.	" nummularia.	" astilboides.
Cyananthus lobatus.	" vulgaris.	" " floribunda.
Dodecatheon Jeffreyanum.	Lythrum Salicaria splendens.	" elegans.
" Meadia.	Monarda didyma.	" kamtschatica.
" " alba.	Onoclea sensibilis.	" palmata.
Drosera longifolia.	Orchis conopsea.	" " alba.
" rotundifolia.	" foliosa.	" Ulmaria plena.
Eomecon chionantha.	" latifolia.	" venusta.
Epilobium augustifolium.	Osmunda regalis and varieties.	Struthiopteris Pennsylvania.
Epipactis palustris.	Polygonum compactum.	Symphytum bohemicum.
Equisetums, British species.	" Sieboldi.	Thalictrum flavum.
Helonias bullata.	Primula denticulata.	" glaucum.
Hottonia "	" farinosa.	Trollius europæus.
Iris fœtidissima.	" japonica.	Typha augustifolia.
" fulva.	" Munroi.	" major.
" Kæmpferi.	" rosea.	" minor.
" pseud-acorus.		

SUMMER HOUSES, ARCHES AND STATUARY.

There are a few accessories that tend to make a garden enjoyable—always provided they are judiciously selected and disposed; overcrowding with them offends good taste and suggests vulgarity.

Summer houses appear to be indispensable in many gardens, yet they defeat their purpose when converted into tool sheds, as too many are, even in summer. Those rustic structures to be seen in various town and suburban gardens, are supplied by specialists as tenant's fixtures, and can be moved on change of residence. If disposed

under the branches of an overhanging tree, also three-parts enclosed by shrubs, they would not be so objectionably conspicuous, while affording agreeable resorts during that period of the year when coolness and shade are most appreciated.

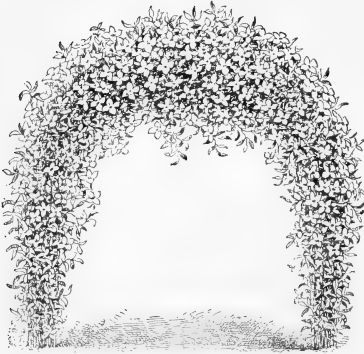


Fig. 59. CLEMATIS ARCH (WELL FURNISHED).

In country gardens, home-made summer houses are more general, and these roomy, heavily thatched structures are, it must be conceded, highly enjoyable. They are usually situated, as they should be, in somewhat retired spots, and open out to a flower garden, rosery, fernery, or children's gardens. The hexagonal form is much favoured, and for posts, stout, straight, roughly trimmed oak limbs are employed. Three openings are left, while the other sections and roof are formed of common building

wood. A heavy thatch of reeds insures coolness, and, as far as the exterior is concerned, completes the rustic appearance. The interior affords opportunities for displaying ingenuity in panelling with split hazel or birch branches duly varnished, the seat being covered with the same material and a wood floor put down. The open oak posts can be clothed with climbing roses, clematisses, honeysuckles, and other climbers.

The majority of persons will find it more satisfactory to purchase summer-houses than to make them; they can be had from three guineas upwards according to size and style.

In larger pleasure grounds, more elaborate structures, built principally with stone in the Grecian style, are sometimes to be met with at the ends of long walks and other suitable positions, and answer their purpose as resting places during hot or showery weather.

For coolness and beauty, an arbour is often preferred to a formal summer house, and may consist of a simple rustic framework, or a few untrimmed posts with lighter poles across the top and sides, with connecting wires



Fig. 60. CLEMATIS ARCH (BADLY FURNISHED).

to form a trellis for supporting vines, hops, gourds, tropæolums, Virginian creepers, aristolochias, and other rapid-growing climbers.

ARCHES properly furnished with climbers (see Fig. 59) are worthy of the trouble bestowed upon them, but if fixed in wrong places, or the plants are neglected (see Fig. 60), they become eyesores. They prove most effective over the gateways dividing



Fig. 61. STATUARY AND LEAFY BACKGROUND.

a kitchen from the pleasure grounds, or at the point of departure from a drive to the lawn; in fact, at the entrance to any enclosure or at the commencement of walks. Galvanised iron framework is principally used of sufficient strength to resist, when heavily clothed with greenery, boisterous winds. When strengthened with roughly trimmed oak or larch posts, the arches are less formal in appearance, and the climbers take more readily to wood than to iron. Rough or rustic arches can also be made,

these having oak posts supporting two iron rods forming the arch, threading the post and rods with galvanised iron wire.

Pergolas, an Italian idea, are being largely preferred to archways for covering a considerable length of walk, but should not be fixed where they would obstruct a good view. Pergolas consist merely of a series of oak uprights not less than 6 inches or more than 9 inches in diameter, arranged 2 feet apart and let well into the ground braced together longitudinally and transversely with lighter poles. In this manner the framework is cheaply constructed, and when clothed with roses, clematises, aristolochias, wistarias, hops, ivies, and other favourite climbers, a delightful promenade is created. Good borders ought to be provided for these climbers, and forest tree roots should not have access to them. Lilies and a variety of other bulbous-rooted plants may be associated with the climbers in the borders without detriment to them.

Statuary is principally to be found in public parks, also in large private gardens, and can be very well dispensed with in small grounds. Rows of figures, busts and groups rarely afford satisfaction, but a few vases judiciously placed and tastefully furnished are admissible, even in small gardens (see page 43). When statuary is desired in pleasure grounds, a single full-length figure arranged with a leafy background shows to the best advantage, and is rendered additionally interesting if commemorative of an historical fact, such as shown in Fig. 61. Shoddy statuary is not worth garden room, and, on the other hand, valuable works of art ought not to be exposed to all weathers, as this has the effect of quickly depreciating their value.

PLANTS FOR ARCHES, ARBOURS AND BOWERS.

Among very strong-growing or rambling plants suitable only for festooning large arbours or pergolas are the Virginian creeper (*Ampelopsis*), Dutchman's pipe (*Aristolochia*), previously referred to; the common hop (*Humulus lupulus*), also the annual Japanese hop (*H. japonica*), of which plants raised from seeds early in the spring will clothe an archway the same season, and grape vines. These kinds cover a large extent of space quickly in the summer and afford dense shade. Also very free in growth, as well as beautiful when in flower, is the *Wistaria sinensis* with its pendent lilac racemes in the spring, and laburnums are much admired when trained over bowers to form arches of golden flowers in May.

Care must be taken that robust kinds do not overgrow others which are less vigorous, but for certain positions more desirable. Among these are the sweet white

summer jasmine (*Jasminum officinale*), the golden winter flowering jasmine (*J. nudiflorum*), and fragrant honeysuckles, such as *Lonicera flexuosa*, *bracteata* and the common woodbine (*L. periclymenum*), while the golden netted (*L. aurea reticulata*) is effective for the pillars of summer houses and the lower part of arches, growing the most freely when cut down annually early in the spring. The free-growing clematisses enumerated on page 85 are admirably adapted for clothing arches and forming bowers, as also is the so-called tea tree, or matrimony tree (*Lycium europæum*). In addition to those we have a grand class of plants, the direct outcome of the florist's skill, and which may be appropriately alluded to here, namely, florist's clematisses, as also some rampant-growing roses.

FLORIST'S CLEMATISES.

Practically all the magnificent varieties of clematisses, with flowers ranging from 4 to 9 inches in diameter, mostly single, but several double, or of rosette form, are the result of cross fertilisation, described and illustrated on pages 23 to 29. The results have been marvellous, amounting in fact to a floral revolution, equal in effect to that shown on the pages cited with begonias and calceolarias and (seeing that clematisses are hardy plants and can be grown outdoors by all who have suitable positions for their cultivation) perhaps of greater value. They are adapted for covering arches, arbours, porches, pillars, and summer houses, making them beautiful by wreaths of handsome flowers.

Though the work of breaking into the clematisses appears to have commenced on the Continent, it was not until Mr. Anderson Henry, of Edinburgh, and Messrs. Jackman & Sons, Woking, concentrated attention on it, about 40 years ago, that startling results were achieved. The rich Clematis Jackmanni took the world by storm in 1863, and soon afterwards came a host of beautiful forms, including the white Mrs. Bateman. Almost every year since has given birth to new beauties under the fostering care of such firms as Messrs. Smith & Sons, Worcester, who exhibit plants so magnificently in pots at our great exhibitions. The flowers represented in the coloured plate (see index) were taken from Messrs. Smith's plants at one of the shows of the Royal Horticultural Society, and are fairly typical of the splendid family to which they belong. Besides those figured, the following varieties are, among others, worthy of general cultivation. They are divided into sections based on the parentage and certain fairly defined characteristics.

SELECTIONS OF FLORIST'S CLEMATISES.

PATENS SECTION.—Flower during May and June on well-ripened wood of the previous year. In pruning, cut away old flowering wood, retaining healthy young growths, from which remove unripened ends. Among the best varieties in this group are the following:—

Devoniensis, bright azure blue, good constitution.
Edouard Desfosse, deep mauve, very free.
Fair Rosamond, bluish white, with wine-red bar.
Lord Londesborough, silvery grey, pale bars.

Mrs. G. Jackman, satiny white, creamy bar, free.
Sir Garnet Wolsley, pale blue, plum-red bar.
Standishi, light lavender blue and free-flowering.
The Queen, mauve violet, fine.

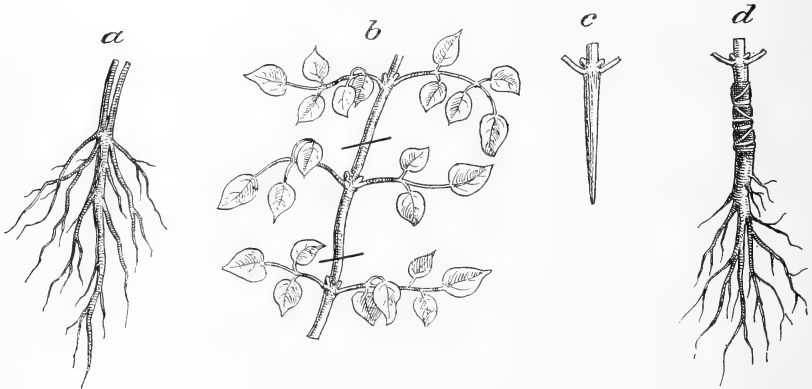


Fig. 62.—GRAFTING CLEMATISES.

a, piece of clematis root for stock; b, growth marked for cutting into scions; c, scion prepared for insertion in stock (a); d, scion and stock bound together ready for potting and starting in heat.

LANUGINOSA SECTION.—Flowers from June to October. The young wood should be lightly shortened at the winter pruning, with a view to having some early flowers and a long succession. In this group are many fine varieties, producing extra large, perfectly-shaped flowers, including:—

alba magna, pure white.
Fairy Queen, pale flesh colour, pink bar.
Impératrice Eugénie, pure white.
Lansonia, rosy purple, dark veins.

Lord Neville, dark plum.
Princess Beatrice, silvery lilac.
Purpurea elegans, violet purple.
Sensation, rich satiny mauve.

FLORIDA SECTION.—Double flowering; at their best during June and July; massive and beautiful; fine out-doors, and grand for conservatory decoration. The plants should be lightly pruned. A good selection would comprise:—

Barillet Deschamps, brilliant mauve.
Belle of Woking, silvery grey.
Duchess of Edinburgh, white, sweet-scented.

John Gould Veitch, lavender blue.
Lucy Lemoine, white, very effective.
Venus Victrix, white.

JACKMANNI SECTION.—Flower from July to October. Probably the best known and most popular on account of the free habit of growth, floriferousness, and richness of colouring, but the flowers are not so large as those of the Lanuginosa type. They are produced on the current season's growth, and in order to avoid having a confused

thicket of leafage and flowers all in one spot, cut the stems down each winter, or early in the spring, to within three or four joints of their starting-point. This will cause the production of strong young growths from near the ground; and if these are well trained, there will be an even and regular display of flowers, see illustration, page 120. Varieties to be grown :—

Jackmanni, deep violet, free and beautiful.

Jackmanni alba, the best of the light-coloured forms.

Gipsy Queen, rich velvety purple.

magnifica, reddish purple, red bars.

Star of India, reddish violet purple, red bars.

tunbridgensis, bluish purple. (All good.)

VITICELLA SECTION.—Flowers from July to October, and should be pruned and treated similarly to *C. Jackmanni*. *Lady Bovill*, greyish blue; *Madame Grange*, crimson violet, tinted red in centre; and *Mrs. James Bateman*, pale lavender, dark veins, can all be recommended, the last-named being a general favourite.

Florist's clematises should be planted in a good depth of rich loamy soil, and be given abundance of water and liquid manure during the growing season. They are principally increased by cleft grafting on roots of *C. flammula* or other common species (see Fig. 62), binding them with matting and placing in small pots filled with gritty, loamy soil, keeping them in a close warm frame or propagating case till the union is complete and the plants grow freely, then gradually inuring to the air till they will endure full exposure. Propagation is also effected by means of cuttings of young wood under hand-lights, and the old rampant-growing species such as *C. montana* and *C. flammula* by layering. Amateurs do not as a rule succeed in propagating the florist's varieties, and it is best to purchase established plants, which are not costly.

ROSES FOR PILLARS AND ARBOURS.

Some of the more robust free-growing varieties are the best for pillars, arbours, and arches, the more delicate Teas failing owing to the action of frost, and the Hybrid Perpetuals from mildew.

VARIETIES FOR PILLARS AND POSTS.

Hybrid Perpetuals.—Anna Alexieff, Climbing Charles Lefebvre, Climbing Jules Margottin and Glory of Waltham.

Bourbon and China.—Charles Lawson, Chénésole, Coup d'Hébé, Paul Verdier, and Paul Perras.

Teas, Noisette, or Hybrid Teas.—Cheshunt Hybrid, Madame Berard, Emilie Dupuy and Madame Eugène Verdier.

Polyantha.—Turner's Crimson Rambler.

VARIETIES FOR ARBOURS, ARCHES AND PERGOLAS.

Hybrid Perpetual.—Annie Wood, Climbing Queen of Queens, Red Rover and Red Dragon.

Bourbon and China.—Blairi No. 2, Fulgens and Vivid.

Teas, Noisettes, and Hybrid Teas.—Bouquet d'Or, Climbing Aimée Vibert, Gloire de Dijon, Pink Rover, Reine Marie Henriette and Waltham Climber No. 2.

Ayrshire.—Thoresbyana, Dundee Rambler and Queen of the Belgians.

Evergreen.—Félicité Perpetué, Flora, Princess Marie and Rampant.

Boursault.—Amadis and Gracilis.

Polyantha.—Turner's Crimson Rambler (the best of all roses for the purpose), Grandiflora and Single Polyantha.

Roses for producing the free growth that is essential for the purposes indicated, require to be planted in rich, deep, loamy soil. They make the best progress when cut severely back when they are starting into growth after planting. Subsequent pruning consists in removing old weakly parts, leaving many of the young growth their full length, but shortening same at different heights from near the ground, upwards, or the lower parts of pillars or arches will be bare and unsightly, as represented in the clematis arch on page 120. Roses are increased by budding, grafting, cuttings, and layering, new varieties being raised from seeds. For cultural details, see the chapter on Roseries to follow.

IVIES FOR PILLARS AND ARCHES.

For affording close surfaces of green or coloured leaves in the winter no plants equal the green and variegated forms of *Hedera helix*. There are varieties with a neat clinging habit of growth and small leaves, suitable for the pillars of summer-houses and the posts of arbours or pergolas; also varieties of more robust growth, with very large foliage, for entirely covering arbours, arches, or pergolas, in shady spots, or, indeed, any positions. The plants, moreover, grow in almost any kind of soil, but the richer it is the better the progress; in dry poor soil ivy is often long in getting established and such soil is the cause of many failures with these (when established) accommodating plants. Ivy is increased by cuttings six inches long, two-thirds inserted in sandy soil under hand-lights in the autumn.

VARIETIES OF IVY (*HEDERA HELIX*.)

<i>Small or medium-leaved Green.</i>	<i>Small-leaved Variegated.</i>	<i>Large-leaved Green.</i>	<i>Large-leaved Variegated.</i>
<i>H. angularis</i> (Emerald Green).	<i>H. argentea marginata.</i>	<i>H. canariensis.</i>	<i>H. canariensis aurea maculata.</i>
* <i>H. atropurpurea.</i>	* <i>H. argentea rubra.</i>	<i>H. cordata.</i>	<i>H. latifolia maculata.</i>
<i>H. digitata.</i>	<i>H. Crippsi.</i>	<i>H. dentata.</i>	* <i>H. marginata robusta.</i>
<i>H. gracilis.</i>	<i>H. elegantissima.</i>	* <i>H. gigantea.</i>	<i>H. vitifolia aurea.</i>
<i>H. himalaica.</i>	<i>H. marmorata.</i>	<i>H. macrodonta.</i>	
<i>H. ovata.</i>	<i>H. rubra lutea.</i>	<i>H. Rœgneriana.</i>	

The varieties prefixed by an asterisk are distinct, and good in their respective sections.

ORNAMENTAL TREES AND SHRUBS.

NOT till four or five years after a landscape gardener has done his work in stocking the surroundings with trees and shrubs, can a residence be considered thoroughly enjoyable.

It is true that where "Money is no object" large forest trees and conifers can be transplanted, with tons of soil about the roots, by the aid of machines provided for the purpose, but the majority of persons rely on young trees for producing the desired effect. Fortunately these make rapid progress when they are well planted in good soil, also staked, pruned, and receive otherwise good cultural attention. See pages 50 to 60.

Some kinds of trees are more rapid in growth than others, but are not of such value as many of those which make slower progress. For instance, the Lombardy and other poplars quickly afford shelter and form screens, but with such trees should be associated the slower-growing oak, elm, beech, birch, chestnut, or lime, cutting away the poplars as room is wanted for the others. In like manner, the commoner free-growing flowering trees, shrubs and conifers, should be arranged as advised in the chapters on Suburban and Country Gardens, with a view to producing an early effect, while the choicer kinds attain to an ornamental size.

AVENUES AND SCREEN TREES.

Avenues are principally found in connection with public parks and extensive private grounds. To be effective they should lead up to, or away from a residence or other important structure. If an avenue enclose a comparatively short drive, a somewhat winding course may be advisable, but if it pass through a large demesne, from the front of a noble building, such as Windsor Castle, Badminton, Elvaston Castle, Luton, and many other notable estates, it should be wide, straight, and extend a long distance, to be imposing.

The choice of trees for the purpose must be governed by circumstances, and adaptation of the kinds to the soil. The lime (*Tilia europea*), especially the red-twigged variety, raised from layers, grows freely in moist loamy soil, the trees soon attaining large dimensions; but seedling trees cannot be depended upon for the desired

uniformity in avenues. The common elm (*Ulmus campestris*), the wych elm (*Ulmus montana*), also the stately Huntingdon variety, are most at home when rooting in a deep alluvial soil resting on gravel. The horse chestnut (*Æsculus hippocastanum*) succeeds best in a somewhat sheltered position, and an avenue, such as that in Bushey Park, is a grand sight when the trees are in flower. Effective also is the Spanish or sweet chestnut (*Castanea sativa*), both when the trees are in flower or fruiting. They are seen at their best in the neighbourhood of Ampthill and Woburn, where the soil is light and sandy. The common beech (*Fagus sylvatica*) on a chalky soil or sandy loam, develops into a noble tree and forms grand avenues, as at Compton Bassett, Wilts, Belvoir Castle, and on various other estates. The common oak (*Quercus robur*) is the slowest of all trees in forming large avenues, and is consequently the least planted, though it lasts the longest after it is fully grown. Oaks make the best progress in strong, yet gravelly soil. At Longleat, Wilts, there is a grand avenue composed principally of different species of elms, with a few limes, and young trees have been planted to take the place of the giants when they fail. This is a wise precaution worthy of general imitation, large old elms being liable to break up suddenly on a bright summer's day. On this account the common elm is not a safe tree to plant in places of public resort. At Marston House, Frome, an avenue has been formed of spreading limes and erect elms alternately, and affords satisfaction, but most avenues are formed of one kind of tree only, and such are usually the most satisfactory.

There are also a dozen or more kinds of conifers suitable for avenues, especially in pleasure grounds. *Araucaria imbricata*, planted in deep loam, in a high and dry sheltered position, becomes distinctly effective, but when the trees lose their lower branches their appearance is anything but attractive. *Abies nobilis*, *Nordmanniana*, *Douglassi*, *pinsapo* and *orientalis*, when in the best condition make grand avenue trees, the example at Madresfield Court being magnificent. Cedar of Lebanon (*Cedrus Libani*) in the course of time forms an imposing avenue, as may be seen at Powderham Castle, Devonshire. This species should have well-drained, deep, rich sandy soil. The Mount Atlas cedar (*Cedrus atlantica*), more erect in habit, is preferred for exposed sites and chalky soils, while the Wellingtonia (*Sequoia gigantea*) succeeds admirably in most positions, if the soil is good; a striking avenue of it is formed at Orton Longueville, near Peterborough. The deodar (*Cedrus Deodara*) is a very handsome species, but must have a sheltered place, and the tall, slender, bright green *Thuia Lobbi* (*gigantea*) should not be overlooked where there is not unlimited space for lateral development.

When planting for avenues, the known habit of growth of the trees must always be taken into consideration. In many instances they are planted much too closely. Not only is ample space necessary between the trees, but they ought also to be set well back from road or grass ride, or much lopping will eventually be needed to keep them within bounds. Beeches, chestnuts, and oaks, may be planted 36 feet apart and not less than 18 feet from the edge of a drive; while elms for reasons already given should never overhang a road, and these, therefore, ought to be arranged from 30 to 36 feet apart, and at least half that distance from the drive. Limes and hornbeams require rather less space, 30 feet apart and 12 feet from the road answering well for them. Conifers might be planted 20 feet apart and 10 feet from a walk or road. Where there is room, a double line of trees, angled on each side, makes an avenue more imposing. For a few years the ground around the main trees might be occupied by others less vigorous, and also shrubs, moving these before they interfere with the trees intended to form the avenue. Ivy may be allowed to cover the ground at the base of trees established, but if permitted to take possession of the stems it is an impediment to free growth.

It is of importance that all the trees planted to form an avenue be of one age and similarly treated to secure uniformity in growth. The trees must be protected from injury by cattle, sheep, and ground game. There are a variety of methods of protection.

Iron fencing is the most durable and the cheapest in the end, but it must not be so near the trees as to interfere with their growth, or permit cattle to reach them. When the branches are unduly confined by a fence, or can be eaten by animals, trees are gradually ruined. Hundreds, probably thousands, are disfigured similarly to that shown on Fig. 63, in various parts of the country, and they contrast most unfavourably with a perfect specimen (Fig. 64) of the same age, which would be an ornament to any garden and worthy of being cherished by its owner.

Screens are desirable in the majority of newly formed gardens and pleasure grounds, for insuring privacy, masking undesirable objects, and for affording shelter from cold



Fig. 63. WELLINGTONIA (RESTRICTED).

cutting winds. North and north-easterly gales not unfrequently prove more destructive to choice trees, shrubs and flowers, than do severe frosts. Where there is ample space, an effective and not unattractive screen may be formed by a double line of Norway spruce (*Abies excelsa*) 10 feet apart, with white poplars (*Populus alba*) 10 feet apart in front of them; the last named may be kept to any desired height, and the contrast between the white foliage and dark background is distinctly marked. If near a dwelling and the position is not much exposed, one or two rows of either *Cupressus Lawsoniana* or *Thuia gigantea*, associated with Lombardy poplars, might be substituted with advantage—the poplars to be cut down when the conifers are tall enough to effect the desired purpose.



Fig. 64. WELLINGTONIA (DEVELOPED).

Sheltering belts, twenty or more yards distant from gardens, may be formed by planting two or more rows of Corsican and Austrian pines 9 feet apart, alternating with larch, the last named to be cut out and eventually some of the evergreens. The appearance of these is sombre, but the shelter they afford in a few years is complete. Wych and Siberian elms are suitable for some positions, with yew, green hollies, or tree box as undergrowth. If the plan of having shelter trees in isolated masses is preferred, these may be advisably so

arranged that the inner series intercept the wind that passes directly between the outer line of groups.

HEDGES ORNAMENTAL AND SERVICEABLE.

Whitethorn or quickset-thorn (*Cratægus oxycantha*) is the most common hedge, and one of the best for utilitarian purposes, but cannot be regarded as ornamental in comparison with some others that will be named. The myrobalan or cherry plum (*Prunus cerasifera*) has been recommended as a substitute for the familiar thorn, than which

it grows more freely, but cannot make so close a fence. The myrobalan is more suitable for boundaries in woodlands than in dressed grounds. Holly or privet (*Ligustrum*) are not infrequently mixed with quick-thorns for hedges, but the mixture does not long remain uniform, one or the other growing the more rapidly, with the consequent degeneration of the weaker; it is a question of the "survival of the fittest" for the soil and situation.

Hedges of common laurel are frequently seen, but only rarely in satisfactory condition. They are not adapted to all soils, while they are liable to be killed to the ground by severe frost. Where laurels thrive and hedges are desired, the *Colchic* variety is the best to plant, as being more hardy than the common form, and less liable to injury by rabbits. The appearance of holly hedges is spoiled by clipping them with shears. They should be cut with knives—rather a tedious operation—not severing the leaves.

In soils where the common holly (*Ilex aquifolium*) luxuriates, it forms a deep green impenetrable boundary fence, and, well kept, is decidedly ornamental. The holly hedges by the side of the highway that passes through Baron Schröder's estate at Englefield Green, Surrey, may be described as models, and they are admired by thousands of persons who traverse the beautiful district near the great park of Royal Windsor. The soil is gravelly loam. They have been planted upwards of thirty years, and are trimmed annually, during the last week in July, for keeping them close and pleasing in appearance all the year round. If desired, it is not difficult to add what some persons regard as a novel feature, to green holly hedges, by having at intervals globes or pyramids of the Golden or Silver Queen varieties supported above them. They are formed by allowing healthy growths of the green kind to extend, and inserting in them buds, with a leaf attached to each, of the varieties named, at any time when the sap is active in the summer, binding them with matting or worsted, as in budding roses.

The tree box (*Buxus sempervirens*) makes a close, bright green divisional hedge in gardens, and grows the most satisfactorily in chalky soils.

Along the south coast, and even in the neighbourhood of London, hedges of green or variegated Japanese *Euonymuses* succeed admirably, are decidedly attractive and seldom materially injured by frost. They are more hardy than laurels, and also more beautiful.

No hedges are more quickly formed than those of the familiar privet. They may be also close and dense, when clipped twice a year, but are not formidable barriers. The

common kind is superseded by the evergreen (*Ligustrum ovalifolium*) which is now generally chosen for the purpose, by persons who know its value. The leaves are large, stout, and deep green. In pleasing contrast either when grafted on the green species, or planting apart, is the variety *L. aureo marginatum*. This golden privet is a beautiful addition to our hardy shrubs, and small hedges of it brighten the gardens of numerous villas in the suburbs of the metropolis.

The common yew forms a hedge of great density when clipped annually, early in

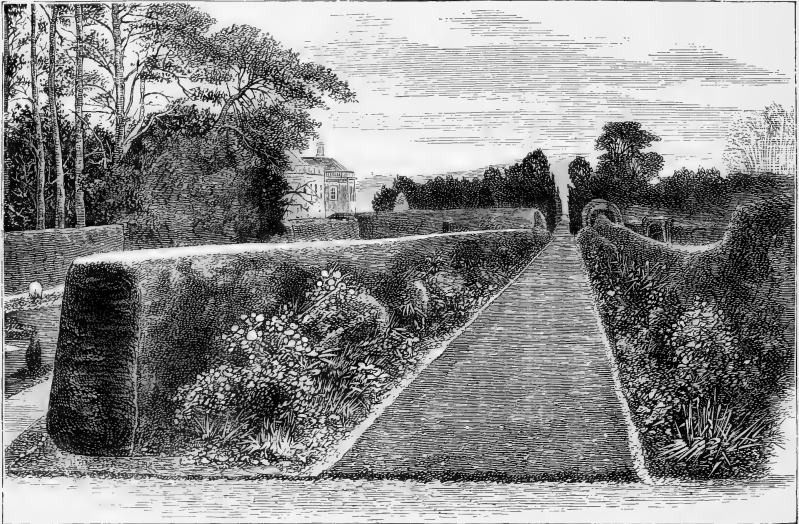


Fig. 65. YEW HEDGES AT HOLME LACY.

August, in time to form a face of fresh growth before winter. The appearance may be sombre, yet stately yew hedges are prominent features in many pleasure grounds, including those of Easton Hall, Lincolnshire; Holme Lacy, Hereford (Fig. 65); and Wickham Court, Kent. Some of these hedges are of great age and gigantic proportions, while not devoid of historical associations; but yew hedges may be formed of any desired size, and can be rendered ornamental in the same way as hollies, by allowing growths to extend here and there, and grafting the golden varieties on them.

At Keir, near Stirling, the ancestral home of the Stirling-Maxwells, the golden yews

established on the green have almost a glittering effect in the sunshine. Leading shoots should be chosen as grafts, not small side branchlets, or free growth cannot be insured. This remark applies with great force to all the conifers, to which the yew is closely allied.

The growths of yews, particularly when withered, are injurious to animals that eat them, a fact which must not only be kept in mind when planting, but also, and especially, in the disposal of the trimmings from hedges or trees.

Hedges of conifers make pleasing and effective screens in gardens. Probably the finest display of conifer hedges in Europe is to be seen in the nurseries of Mr. Charles Van Geert, at Calmpthout, near Antwerp. Most kinds are represented in the divisional lines separating the many sheltered enclosures, the hedges being six feet high, and a foot or more in diameter. The hemlock spruce (*Abies canadensis*) forms a beautiful hedge, where this elegant conifer thrives. *Cupressus Lawsoniana* is excellent for the purpose, but turns brown in winter; so also is *Thuiopsis borealis*, but perhaps the most generally satisfactory of all is Lobb's cypress (*Thuia gigantea*). When clipped, if needed in April, and particularly at the end of July, this conifer forms a hedge of fern-like elegance, and retains its bright glossy green through the winter. It can be established, and retained, of any height desired, and grows well in any ordinarily fertile soil.

Neat hedges for the backs of borders in gardens are formed of the small-leaved evergreen berberises, such as *B. dulcis* and others of that character, while taller screens can be established with beech and hornbeam, but they are perhaps more useful than ornamental.

Hedges of roses are desired and dreamed about by many people, but are realised satisfactorily by few. Mixing several varieties to form a continuous line usually ends in patchiness, the strong overgrowing the weak and gradually crowding them out of existence. The close, compact-growing, small-leaved and small-flowered Scotch rose (*Rosa spinosissima*) makes a neat divisional screen in gardens, while sweet briar, or eglantine hedges (*Rosa rubiginosa*) are very delightful in appropriate positions, because of the fragrance they dispense all around.

For securing quick growth of whatever may be planted, it is important to provide a deep, free, fertile, rooting area, not merely cutting out a narrow trench, in hard soil. Planting may be done early in autumn, or during genial weather in spring, keeping the ground free from weeds, subsequently trimming the sides of the hedges till the desired height is attained, and preventing their being injured by animals that in certain positions may have access to them, though this contingency does not arise in the majority of gardens and pleasure grounds.

FLOWERING TREES AND SHRUBS.

At no period of the year are gardens and pleasure grounds more delightful than when the most attractive flowering trees and shrubs are laden with their charming blossom, in a delicate setting of tender green. More attention is being given than



Fig. 66. *HALESIA TETRAETERA* (THE SNOWDROP TREE).

formerly, to hardy flowering deciduous trees and shrubs, that render home surroundings so beautiful in the spring, and not only are old favourites being planted more freely, but newer kinds and varieties are sought for and obtained. Instead of planting so many uninteresting laurels, also cheap and common conifers, so heavy and formal, let us have more elegance and freedom by a due proportion of diverse kinds, and with such glorious wreaths of flowers, as many trees and shrubs give us in the spring and early summer, there ought to be no hesitation in planting them in gardens large or small.

Of Deciduous Trees with beautiful flowers so many kinds and varieties confront us as meritorious, that only brief reference can be made to some that ought not to be overlooked. The ordinary horse chestnut, double and single, is too large for small gardens, but the red species (*Æsculus rubicunda*) is of medium growth and beautiful when in flower; while the richest of all—*Æ. Briotti*—is a

variety that will be more freely planted when its merits are known. Double and single almonds and peaches (*Amygdalus*), in variety, are among the first flowering trees of the year, being usually laden with blossom in February and March. They are much grown around London, and require sunny positions for ripening the wood and the formation of blossom buds. The snowy mespilus (*Amelanchier canadensis*, or *Botryapium*) attains a height of 20 feet, and is covered as with a snowy mantle in the spring. It is also known as *Pyrus Botryapium*.

Catalpa bignonioides is a good lawn tree, growing upwards of 20 feet high, and is remarkable for its bold foliage and handsome panicles of flowers. Double cherries (*Cerasus vulgaris* fl. pl.) 20 to 30 feet, white or rose coloured, are highly attractive, as is the Judas tree (*Cercis siliquastrum*) when laden with its pea-shaped purplish flowers in a setting of yellowish green foliage. *Cladastris tinctoria*, synonym, *Virgilia lutea*, produces racemes of white flowers freely and can be grown almost anywhere. Double, white, pink, and scarlet hawthorns (*Crataegus oxycantha*) have been previously mentioned and are indispensable. The flowering ash (*Fraxinus ornus*) attains a height of 20 to 30 feet, and in May and June is sufficiently attractive to entitle it to a place in pleasure grounds.



Fig. 67. *STYRAX JAPONICA*.

The Snowdrop tree (*Halesia tetraptera*) (Fig. 66) and the charming *Styrax japonica* (Fig. 67), which produce multitudes of snowdrop-like flowers in the spring, should not be omitted from choice collections; height 15 to 20 feet. *Koelreuteria paniculata*, 10 to 15 feet, produces charming panicles of yellow flowers in June and

July. It succeeds best in a somewhat sheltered position. The common laburnum (*Cytisus Laburnum*), also the late Scotch laburnum (*C. alpinus*), and the purplish-flowered *Cytisus Adami*, are particularly bright in April and May, the two first-named effectively contrasting with the purple beech, and the purple-leaved, pinkish white flowering *Prunus Pissardi*.

In the Tulip tree (*Liriodendron tulipifera*) we have a noble lawn ornament of erect habit and reaching a height of 80 feet; it has handsome foliage and produces tulip-like flowers freely in June. The Yulan (*Magnolia conspicua*) develops into a tree 20 to 40 feet high and produces large, handsome, purple and white flowers from February to May. It should have a sheltered position and rich open soil. The bird cherry (*Prunus padus*), 20 to 30 feet, gives a profusion of white flowers about the same period; and very beautiful is *Pyrus spectabile* when laden with its semi-double, rose-coloured blossom in April and May. The false acacias (*Robinia pseud-acacia*), white, also the rosy-pink form (*R. p. Decaisneana*) are very handsome and deservedly popular. They attain a height of 30 to 50 feet and flower in May and June.

DECIDUOUS FLOWERING SHRUBS.

Æsculus or *Pavia macrostachya*, known as the smooth-fruited horse chestnut, produces handsome racemes of white flowers in April and May, height 5 to 9 feet. *Amelanchier Botryapium (canadensis)* is well worthy of culture as a shrub, both for its free flowering habit of growth and the beauty of its foliage in the autumn; colour of flower white: April. *Amygdalus nana* only grows about 3 feet high and produces rose-coloured flowers freely in March. *Azalea pontica*, in variety, 4 to 6 feet, imparts brightness to gardens in May. *Azalea mollis* is sturdier, and of this there are several good forms. *Azaleas* usually succeed the best in firm peaty soil, and the fine surface roots must not be disturbed by the spade. They are the most effective in groups.

Hibiscus syriacus (Fig. 68), of which there are a large number of varieties, attains a height of 6 feet, and is very gay in August. Sweet amber (*Hypericum androsæmum*), 3 feet, also flowers in the summer, and should be pruned in the spring. *Kerria japonica flore pleno*, usually seen against walls and porches, may also be grown as a bush in the open. It is so grown at Belvoir Castle, and affords wreaths of its golden rosette-like flowers. In *Leycesteria formosa* we have a handsome and distinct shrub, about 6 feet high, producing racemes of purplish

flowers all through the summer. The better-known mock orange (*Philadelphus coronarius*) deserves its popularity, and the double form is effective, as also are the later *Gordonianus* and *P. grandiflorus*. These fine species flower in June, and should be more extensively planted; height 10 to 15 feet. *Pyrus japonica*, when



Fig. 68. *HIBISCUS SYRIACUS*.

flowering freely in bush form, is very brilliant; totally different, but not less attractive, is *P. Malus floribundus* when laden with myriads of rosy pink blossoms in April and May.

The common barberry (*Berberis vulgaris*) is attractive when laden with its coral-like fruits; 8 to 15 feet. Carolina allspice (*Calycanthus floridus*) forms a bush about 6

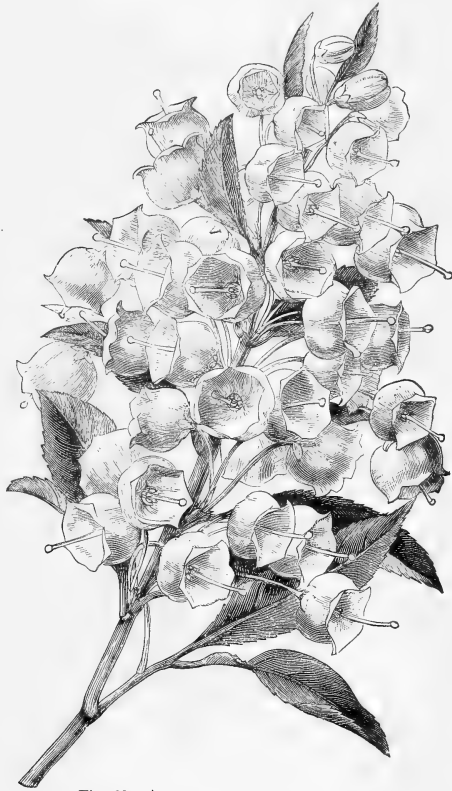
feet high, and the flowers, purplish in colour, are apple-scented. *Chionanthus virginica*, 10 to 20 feet, produces handsome racemes of white flowers in May, requires moist peaty soil or sandy loam, and a sheltered position. The woody bladder senna (*Colutea arborescens*), height 6 to 10 feet, flowers yellow, June to August, will grow in almost any soil. Both the cornelian cherry (*Cornus Mas*), and the dogberry (*Cornus sanguinea*), are worthy of a place in the shrubberies, as are *Cytisus purpureus*, *C. albus* (white broom), *C. scoparius* (the common broom), and the beautiful *C. scoparius Andreanus*. The *Mezereum* (*Daphne Mezereum*), white or red, are very old favourites, these dwarf bushes flowering freely in the spring, and are also attractive when the fruit is ripe. *Deutzia crenata flore pleno*, double white and double pink tinted, attain a height of 4 to 8 feet and flower abundantly, while the white *Deutzia gracilis*, usually seen in pots, is equally hardy and flowers profusely in the spring. Free bushes of *Forsythia suspensa* are extremely bright and cheerful when covered with soft yellow flowers in the early months of the year. This and other *Forsythias* are worthy of general culture. The Virginian form of witch-hazel (*Hamamelis virginia*) is little known but deserves a place in the larger collections.

The smoke tree (*Rhus cotinus*) flowers in July, and in the autumn the curling, feathery seed appendages have given to this shrub its popular name. The yellow and red flowering currants, *Ribes aureum* and *sanguineum*, so charming in spring, are too well known to need further reference; and it is a pity the same cannot be said of the Spanish broom (*Spartium junceum*) with its rush-like growth and sweet-scented yellow flowers in summer. *Spiceas arizæfolia*, *Douglasi*, *Lindleyana*, *prunifolia*, and *Reevesiana* are free-growing and abundant flowering shrubs, the first-named being particularly elegant.

Everybody knows, and most persons admire, the common lilac (*Syringa vulgaris*), also the small-leaved Persian species, but the improved forms ought to receive the attention of planters. *Alba grandiflora* and *Madame Legeraye* are beautiful single white varieties, and among the dark colours are *Charles X.*, *Dr. Lindley*, *Geante des Batailles*, *Philemon*, *rubra grandiflora*, and the handsome *Souvenir de L. Spath*. *Madame Lemoine* is the finest double white, and *hyacinthæflore pleno*, *La Tour d'Auvergne* and *Lemoinei flore pleno* are good double dark varieties. Handsome trees of the Gueldres rose (*Viburnum opulus*) are to be seen with its snow-ball-like flowers in most gardens, and so ought bushes of the showy *Weigela rosea*, of which there are several pleasing varieties.

EVERGREEN FLOWERING SHRUBS.

Although the kinds of these are not very numerous, rhododendrons alone make a brilliant and diversified display. There are, however, a few others to be noticed. *Arbutus Uedo* (the strawberry tree) produces drooping panicles of white flowers in September, and globose fruit, which changes to red in the following year. *Arbutus Andrachne*, if grown in a light sandy or peaty soil, develops into a handsome bush, 10 feet high, and is hardy in most southern districts. *Andromeda floribunda*, *japonica*, and *speciosa*, are compact-growing shrubs, producing an abundance of wax-like flowers in the spring. *A. speciosa cassinæflora* is represented in Fig. 69. There are few more effective plants than *Berberis Darwini*, a group of these, when in flower, giving a rich glow of colour, height from 2 to 4 feet, dense growth, flowers rich orange. *Berberis dulcis* or *buxifolia*, and *B. Fortunei* are also hardy and good. *Buddleia globosa*, sub-evergreen, requires a sandy soil and sheltered yet sunny position in most districts. Under favourable conditions it gives numerous clusters of orange-coloured globular flowers in May.

Fig. 69. *ANDROMEDA SPECIOSA CASSINÆFLORA.*

The gum cistus (*Cistus ladaniferus*) forms a neat bush and is very gay in June, the flowers, however, being fugitive. *Cotoneaster microphylla* is of compact growth, leaves small, flowers abundant and fruit showy. *Cotoneaster Simonsi* grows more vigorously and is only partially evergreen. This also fruits freely, the red berries hanging through the winter. *Daphne collina* is of erect growth and gives

pinkish flowers, while *Daphne pontica* is more spreading in habit and produces heads of greenish yellow, sweet-scented flowers freely in April and May. Among hardy heaths *Ericas arborea*, *codonodes*, and *mediterranea* are suitable for shrubbery



Fig. 70. RHODODENDRON PRINCESS WILLIAM OF WURTEMBERG.

borders, while *E. carnea*, of low dense habit, is a charming kind for margins, the flowers numerous from January to April, and pale red in colour. *Escallonia macrantha* forms a compact bush, with green glossy leaves and crimson red flowers, but requires a sheltered position.

Garrya elliptica, when in a bush form, 6 to 8 feet high, and well furnished with its greenish white catkin-like flowers, is distinctly attractive in appearance, but not perfectly hardy, and in the colder districts must be grown against walls. Japanese privet (*Ligustrum japonicum*) grows vigorously, forming bushes 6 to 8 feet in height and yields a profusion of handsome spikes of white, powerfully-scented flowers in June.

Common furze, or gorse (*Ulex europæus*), single and double, form dense golden bushes when flowering both in the spring and autumn. The well-known laurustinus (*Viburnum tinus*) though not quite so hardy as desirable, is yet one of the best winter and spring flowering shrubs. In addition to the type, the varieties *Froebellii lucidum*, *strictum*, and *virgatum* are worthy of a trial.

Rhododendrons (Fig. 70) are the grandest of hardy evergreen shrubs. Where they become well established little or no attention is required, beyond picking off the old seed pods and cutting away other commoner shrubs that interfere with their progress. It is a mistake to think they must be wholly grown in peaty soil, as, although this suits them, the plants, if started in a mixture of peat, leaf soil, loam and sand, eventually root freely into the ordinary surrounding soil if it be free from lime or chalk. A cool, moist, rather than a hot and dry, position is the more favourable, but digging deeply amongst them is injurious. The varieties are very numerous, also constantly increasing, and judicious selections of any required number can be obtained from the leading nurserymen. The following are, however, of proved excellence, and grouped under their respective colours.

VARIETIES OF RHODODENDRONS.

WHITE AND BLUSH CHANGING TO WHITE.—*Album grandiflorum*, fine white; *A. elegans*, good shape; *A. triumphans*, large bold flower; *Delicatum*, white, brown blotch; *Exquisite*, white, buff spots; *Ingram*, bluish white, chocolate spot; *Mrs. J. Clutton*, one of the best whites; *Madame Carvalho*, remarkably fine, green spots; *Mrs. Tom Agnew*, bluish white, lemon blotch; *Perfection* (*Standish*), bluish white, fine form; *Purity*, bluish white, faint yellow eye, fine; *The Queen*, lilac bluish to nearly white; *Duchess of Cambridge*, white, yellow spot. The three following whites are distinctly marked and spotted:—*Countess of Normanton*, white, dark maroon spot, large flower, good; *Jean Stearn*, white, purple spot; *Lady Guinness*, white, maroon spot, a very fine variety.

PURPLE AND MAUVE.—*King of the Purples*, very fine; *Nero*, purple, dark blotch, very good; *Old Port*, purple, good habit; *Purpureum elegans*, very compact and fine; *Schiller*, bluish purple, dark spot; *Sir Thomas Sebright*, purple, bronze blotch; *Everestianum*, mauve, fringed edge, full and attractive; *Fastuosum flore-pleno*, mauve, semi-double; *Surprise*, mauve, with an intense blotch.

PLUM AND LAKE.—*Joseph Whitworth*, lake, very much spotted, noble flower and truss; *Cruentum*, lake; *Fervum*, plum; and *W. H. Punchard*, plum, orange centre, quite distinct.

SALMON PINK.—*Lady Frances Crossley*; *Mrs. H. S. Holford*, very distinct and good; and *Mrs. John Penn*.

PINKS AND LIGHT ROSE SHADES.—Kate Waterer, rosy pink, with green blotch, very beautiful; Lady Grenville, light with pink edge, very delicate; Mrs. N. Agnew, light pink, bright edge, pale orange centre, very handsome; Mrs. Williams, light rosy pink, distinct and beautiful; Mrs. Heywood, very delicate pink, orange blotch; Madame Van de Weiger, rich pink crimson blotch; Duchess of Edinburgh, rosy pink, handsome, medium size truss; John Spencer, pink.

ROSE AND BRIGHT ROSE.—Lady Falmouth, rose, black blotch, excellent; Mrs. Thomas Longman, bright rose, with a light brown blotch; Mrs. Thomas Wain, purplish rose, chocolate blush; W. E. Gladstone, much spotted, with brownish spots; Titian, very brilliant rose; Notable, fine rose, good truss; Lady Eleanor Cathcart, rose pink, with chocolate blotch; Lady Armstrong, light centre, very dark spot, beautiful.

CRIMSON AND SCARLETS.—Beauty of Surrey, dark crimson; Charles Bagley, cherry red; Frederick

Waterer, very bright, one of the best; H. W. Sargent, large truss, good; H. H. Hunnewell, dark crimson; James Bateman, scarlet crimson; John Waterer, very fine; Lord Selborne, rich and good; Michael Waterer, scarlet crimson, one of the best; Meteor, bright scarlet crimson, fine; Pelopidas, fine, showy truss; William Austin, bright and free bloomer.

ROSY CRIMSONS.—Alexander Dancer, very bright, good; Archimedes, rosy crimson, lighter centre; Blandyanum, fine truss; Decorator, good spot; Mrs. Joseph Shuttleworth, fine, intense blotch; Raphael, large, spotted crimson.

VARIOUS.—The following, which have the colours more or less mixed, are also very attractive:—Alarm, white centre, bright crimson edge; Miss Owen, delicate pink, spotted; Duchess of Sutherland, white margin, rosy lilac; Baroness Schröder, white centre, bordered with pink; and Princess William of Wurtemberg (Veitch), white pink and crimson (Fig. 70).

DECIDUOUS TREES WITH ORNAMENTAL FOLIAGE.

Deciduous trees of various sizes, though devoid of floral beauty, are indispensable in the furnishing of gardens and pleasure grounds, whether they are attached to villas or to more or less extensive demesnes. There are many types of beauty in our leaf-shedding trees. Some are imposing, such as the towering elms, spreading beeches, and majestic oaks; some are dense and massive, as in chestnuts, planes, and sycamores; others are elegant in contour, as the slender birches and graceful acacias; while several are remarkable for the distinct or variegated colour of their foliage.

Trees differ alike in stature, habit, and character of their leafage: they are, moreover, ever changing in the season of growth—from the tender virgin green of spring to the deeper, and often brighter, robe of summer, culminating in the still richer glow of autumn, as a brilliant flash of beauty before they fall. And when the leaves are gone there is beauty still in trees—in the wonderful ramifications of their branches and slender network of twigs, each turned in the direction that will best present the leaves they will bear to the life-giving light for the fulfilment of their duty and vitally important mission (see pp. 12, 13, 18, 19, 20).

If it is true, as it is, that “perfect beauty is perfect fitness for a perfect use,” then are deciduous trees in winter beautiful indeed; but they often have an added

beauty, when encrusted with countless myriads of frost crystals, rendering every twig a picture, the like of which cannot be formed by human hand. As a matter of fact, healthy trees are ornamental at all times and in all seasons when appropriate to the positions in which they are planted.

Instructions on planting, also on root and branch pruning, are recorded on pages 56 to 58 (which see), the diagrammatic illustrations now given represent the good and bad methods there alluded to, with the results in both cases. Fig. 71 shows a young tree with its roots twisted into a narrow excavation (as if for setting a post) in hard ground, and the soil packed mound-like round the stem; branches unshortened.

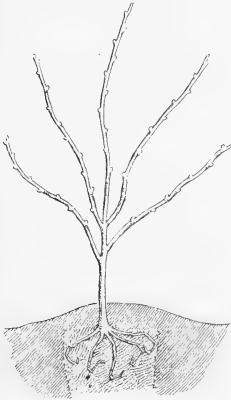


Fig. 71. BAD PLANTING AND NON-PRUNING.



Fig. 72. RESULTS OF FAULTY PRACTICE (UNSATISFACTORY GROWTH).

The few contracted roots, from which the mound throws off the rain, are wholly inadequate for supporting the long branches and healthy growth from them, and a stunted unsatisfactory tree (Fig. 72) is inevitable.

Fig. 73 (next page) shows the broken roots cut smooth, spread out in ground that has been well broken up, the soil not piled round the stem, the long branches shortened at the marks, the short ones not cut back. Result, free root extension, and correspondingly free growth represented in Fig 74. It should be noted that both trees are of the same age, and planted at the same time; the stunted tree being the penalty for erroneous and much too common practice, the thrifty specimen the reward for intelligent work.

As before stated, trees should not be planted so near to flower beds, rose borders, or rockeries, as to fill them with roots to deprive the flowering plants of support. Deciduous trees, when rightly placed, are decidedly ornamental on lawns, while affording shady resorts that are much enjoyed during the hottest days of summer.



Fig. 73. GOOD PLANTING—
ROOT AND BRANCH PRUNING.

It is seldom prudent to plant a strong-growing tree exactly in the middle of a lawn; trees have a better appearance, and so has the lawn, when planted towards the outskirts, and, unless screens are required, an individual tree, with space for development, will be more satisfactory than a number grouped together, and, as is too frequently seen, spoiling each other.

A few, out of many, ornamental deciduous trees will be named. Of the acers, or maples, the silver maple (*Acer dasycarpum*) is a favourite



Fig. 74. RESULTS OF GOOD PRACTICE
(SATISFACTORY PROGRESS).

with many persons, because of the whiteness of its leaves and stems. The plane-like Norway maple (*Acer platanoides*) and its purple-leaved variety, Schwedleri, make handsome trees as does the large-leaved *Acer macrophyllum*. They grow rapidly in good soil, and attain a height of 40 to 60 feet. The sycamore (*Acer pseudo-platanus*) is also a strong grower, and suitable for exposed positions. The purple-leaved variety merits notice, as does the beautiful variegated form, Leopoldi.

Much less robust is *Acer negundo* variegatum, also known as *Negundo fraxinifolium*; it is one of the most beautiful variegated trees, and, when associated with *Clematis Jackmanni*, this rambling over its branches, as at Mentmore and elsewhere, a beautiful effect is created. This acer will grow to a height of 20 feet.

Among the Japanese maples (*Acer polymorphum*) are several beautiful forms, most of them with elegant foliage, soft green at

first, changing to bronze crimson. They are shrubs rather than trees, and can only be recommended for warm districts and sheltered positions.

Acacias have been mentioned amongst flowering trees, but one at least deserves special notice for its free, yet symmetrical, contour and elegant foliage, namely, *Acacia Bessoniana*. An avenue of these in Sutton Court Road, Chiswick, near the Royal Horticultural Society's Gardens, would form one of the most beautiful vistas near London, but for the parochial mutilation of the trees which passes under the name of pruning. This forms a charming lawn tree in the south, and very graceful is the glossy acacia-like *Gleditschia inermis*, which is too little seen in gardens.

Where there is ample room the tree of heaven (*Ailantus glandulosa*) should be planted; it forms a stately tree with handsome pinnate leaves, and, though hardy, is not happy in bleak situations. The silver birch (*Betula alba*), and especially the pendulous variety, are elegant lawn trees; while the hornbeam (*Carpinus betulus*) with its gold and silver variegated forms, are suitable for pleasure grounds and large shrubberies. The beech (*Fagus sylvatica*) is prone to render lawns unsightly by dead leaves and husks, but this must not prejudice the copper (*cuprea*), purple (*purpurea*), or the cut-leaved varieties—*asplenifolia*, *heterophylla*, *incisa*, and *quercifolia*—as these are distinctly ornamental, and those with coloured leaves indispensable. The weeping form, *F. sylvatica pendula*, is also worthy of more general cultivation.

The London plane (*Platanus occidentalis*) makes a noble specimen, and succeeds in damp positions. It is one of the best of shade trees, and also for towns, but often fails in the northerly parts of the kingdom. It ought only to be planted where there is ample space, as it may grow from 50 to 80 feet high. The Oriental plane is of lower growth, with more deeply cut leaves. The value of poplars as screen trees has been pointed out, but, in many high and dry positions, a group of three or four of the Lombardy species (*Populus fastigiata*) might be planted advantageously; when developed they become prominent landmarks. Oaks, suitable for extensive pleasure grounds, are the Turkey (*Quercus cerris*), which is not slow in obtaining a height of 40 feet; the scarlet oak (*Quercus coccinea*), 50 feet; and the slower-growing common oak (*Quercus robur*). *Quercus rubicunda* has reddish purple foliage and is of free growth.

Of a very different description, and more ornamental in a small state, is the stag's-horn sumach (*Rhus typhina*), which grows to a height of 10 to 20 feet. The purple osier (*Salix purpurea*), and hybrids, *Lambertiana*, *ramulosa*, and *Woolgariana*,

succeed well in moist positions, and are ornamental whether in or out of leaf. The common elder (*Sambucus nigra*) is too coarse for pleasure grounds, but the golden form (*S. nigra aurea*) is one of the best deciduous shrubs for giving an immediate effect, cutting it away when choicer shrubs require more room. This, also the gold and silver variegated kinds, and the cut-leaved elder, grow well in exposed and smoky districts. The Golden Elder and purple hazel, or filbert (*Corylus avellana atropurpurea*), associate well, as at Swanmore Park, Hants, and in many other gardens and pleasure-grounds.

Where weeping trees are appreciated the Japanese pagoda tree (*Sophora japonica pendula*) ought certainly to be planted. It should have a well-drained position, and succeeds best in sandy loam. The weeping ash, elm, lime, and willow are suitable for lawns when appropriate positions can be found for them. Mention has been made of the ordinary lime and elms as being good for avenues and screens. For the same purpose *Populus tremula* (the Aspen) is excellent; it succeeds well in gravelly and sandy soil, also in towns—even in the middle of London, as may be seen in the Shaftesbury Avenue, between Charing Cross and Oxford Street. The three last-named are too large for small pleasure-grounds.

TREES AND SHRUBS FOR WALLS.

Bare walls and fences are not nearly so much in evidence as they were only a few years ago. Draped with climbing and other plants suitable for the purpose, and which cannot be so well grown elsewhere, they are worthy adjuncts to a well-arranged garden, and the wonder is that the ornamentation of houses and divisional walls and fences in the manner indicated should not have, broadly speaking, received the attention that the subject certainly deserves. We have only to contrast the bare walls of a portion of the front of a house, represented on the next page, with those that have been clothed with a judicious assortment of plants, to strengthen our conviction, if strengthening is needed, that many owners of houses, or persons in charge of gardens, have too long neglected their opportunities. Architects and builders doubtless object to having much of their good work obscured, but, as before hinted, bricks and mortar are not in the ascendant nowadays, and greenery is preferred to glare. The one great hindrance to this form of house and wall decorations, is the fact that the majority of the plants used for the purpose stand in need of

training; nails and shreds are principally brought into requisition for this, but instead of damaging the walls with their use, a much better plan is to provide stout diagonal wire trellising at the outset. This can be either locally constructed or bought ready made in sections 2 feet wide, and fastened to the walls by means of staples. The trellising ought at first to reach to the height of the ground floor, adding more when the lower part is effectively clothed with plants. A few wires strained lengthways



Fig. 75. CLIMBERS AND BLANK WALLS.

1, *Wistaria* in August; 2, *clematis*; 3, roses; 4, variegated ivy.

of the walls through eyes driven in at intervals of not more than 2 feet apart, answer well for *Clematis montana*, *Wistaria sinensis*, Passion Flowers, and other extra strong-growing plants, but the trellising will be found the most generally serviceable for keeping climbers in position. Durable tarred twine ought to be used for securing the main stems or stouter growths, and either small twine or raffia for the smaller or annual growths.

Thousands of trees and shrubs are planted at the foot of walls only to thrive for a short time and then gradually dwindle away. The soil in these positions is invariably of the poorest description, much of it probably having been packed against the foundation walls by the builders. In any case it is likely to become excessively dry and poor. Nothing must be done to interfere with the free drainage of the walls of a house, but fresh soil ought to be substituted for the rubbly mixture, and the roots of healthy free-growing climbers will take care that no moisture is left to injure the structure in the least. It is, indeed, often or usually necessary to supply water, especially to newly planted trees and shrubs, till their roots have spread into the naturally moister and more congenial soil provided. A mere handful of fresh soil is not enough to plant in, but new borders are necessary. These should be at least 2 feet wide and 18 inches deep, using a mixture of one part each of fresh loam, good garden soil and decayed leaves, with a sixth part of the bulk of fine mortar rubbish, wood (not coal) ashes, and sharp grit of some kind added. When peat is required, an equal portion of this may be mixed with the other soil. It is true that ordinarily fertile garden soil may be good enough for many of them, but all would make a better start, and fewer failures occur, in the compost recommended. When the borders have long been occupied by plants that are to make room for new-comers, a complete change of soil is absolutely necessary. Failing to observe this rule has resulted in numberless disappointments, roses and clematises, in particular, refusing to make good progress when planted in soil exhausted of the constituents that tend to make it fertile.

Most trees and shrubs for planting against walls are supplied in pots. The spring is the best time, as a rule, to plant as well as prune, as then all risks of damage from severe frosts is past for the season, and by the time that the sharp weather comes again the plants will be firmly established. Moderately early planting affords opportunity for strong flowering growth to be made the same summer. In some instances a portion of the roots may be loosened from the soil with advantage, as when spread out in the fresh compost they take possession of it the more readily. See that the old ball of soil containing the roots is in a moist state, as if planted dry, water subsequently given will not penetrate the mass nor satisfactory growth follow. Let the plants be placed an inch or two deeper in the ground than they were in the pots and form a saucer-like cavity around them for holding water, which must be given occasionally, for conducting

it to the roots; if planted above the level, as if on small mounds, the water passes from them, the plants languishing or dying accordingly. Pack the soil firmly down about the roots, not patting it smoothly round the stems only, as is too frequently done by the inexperienced, both amateurs and persons who call themselves gardeners. Narrow borders ought not to be turfed over for two or three years after planting, if at all, as turf excludes much warmth, air and moisture, in which case healthy growth is impossible. A mulching, or lightly covering the surface with manure, acts most beneficially. If it is objected to on the ground of unsightliness or otherwise, cover it with fresh soil.

Many apparently worn-out roses, clematises, cratæguses, jasmines, honeysuckles, roses and other wall plants, might be brought into a much more presentable state by freely cutting them back early in the spring. In some instances they may be cut down to near the ground with advantage, and when commencing fresh growth, partially lifted, and the roots, after pruning broken ends smooth, laid in fresh soil. Neglecting to prune and regulate the growths of wall trees or plants leads to their becoming unsightly. It does not follow that undue primness is advocated. On the contrary, a certain amount of freedom is desirable, especially in the case of trailers; and as new growths are usually the most floriferous and ornamental, spring pruning ought not to be neglected. Strong-growing ivies in particular should be closely trimmed when fresh growth is starting in the spring, cutting away all the old leaves as well as straggling growths. This prevents much breaking away from the walls, and a fresh close surface of glossy leaves speedily follows. Ivies are practically the only evergreen clinging plants, and some of the best large, medium, and small-leaved varieties are enumerated on page 126.

The strong-growing Virginian creepers (*Ampelopsis*) require to be kept within bounds. They produce festoons of growths in summer; in some cases the streamers almost covering the windows of numbers of residences in the suburbs of London. The growths do not cling to walls, but those of *Ampelopsis muralis* do, but not with the same tenacity as those of the best of wall-covering plants in summer, *A. tricuspidata* or *Veitchi*, which forms a close green surface in early summer, changing to purplish bronze or brilliant crimson, such as no other plant can equal for the purpose to which it is so extensively and effectively devoted. Much that has been advanced concerning the early treatment of newly-planted trees and shrubs on page 58, also applies to many of those newly planted against walls, and special hints upon pruning clematises are given

on page 124, while climbing roses will be found on page 125, also treated in subsequent pages. These, also many other plants and shrubs, are increased by layering by one or other of the methods represented in Fig. 76.

Trees and shrubs suitable for growing against walls, most of which have been already alluded to, are as follows:—

EVERGREEN.

AKEBIA QUINATA.—Chusan. Height 10 feet, moderately hardy, twining; flowers purplish brown in racemes. March; sheltered position; sandy loam; leaf-soil and peat. Increased by cuttings and division.

AZARA MICROPHYLLA.—Valdavia. Height 12 feet. Hardy; pleasing foliage; small fragrant flowers in summer, followed by orange-coloured berries. Ordinary soil; ripened cuttings in sand under glass in slight heat.

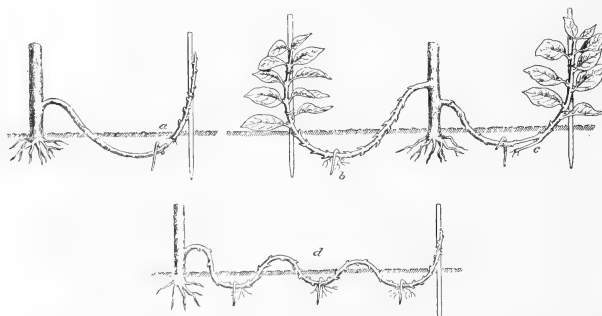


Fig. 76. METHODS OF LAYERING.

a, ringing (or the removal of bark); b, notching; c, slitting; d, serpentine layer.

BERBERIDOPSIS CORALLINA (Coral Berry).—Chili.

Height 5 to 10 feet. Flowers crimson, summer; sunny wall; ordinary soil. Seeds sown in the spring, layering in the autumn, and cuttings of young wood in gentle heat in spring.

BERBERIS DARWINI (Darwin's Barberry).—Chili.

Height 3 feet; shrubby. Flowers orange, abundant in May and sometimes in the autumn. Any position; ordinary soil. Layers, suckers, ripened cuttings in cold frame and seeds sown fresh from the pulp.

CEANOETHUS AZUREUS.—Mexico. Height 10 feet.

Moderately hardy. Flowers azure blue; April and May; Gloire de Versailles an improvement on the type. Sunny, well-drained position; ordinary soil. Layers, and by cuttings of ripened wood under hand-lights in the autumn.

CHOISYA TERNATA (Mexican Orange Flower).—Mode-

rately hardy; height 6 feet; flowers white, sweet-scented. Sunny position; peaty soil. Cuttings of firm wood under hand-glass in gentle heat during spring or early summer months.

COTONEASTER (Rose Box), *C. microphylla.*—Nepaul.

Height 3 to 5 feet; dense; flowers white, abundant in April and May; crimson berries in the winter. *C. Simmondsi*, evergreen in mild winters, height 4 to 6 feet, of free growth. Flowers in April, followed by scarlet berries in the winter. Exposed positions; common soil; seed sown in the spring, cuttings and layers in the autumn, also by grafting on the quince or hawthorn.

CRATEGUS PYRACANTHA (Evergreen Thorn).—South

Europe. Height 10 to 20 feet. Flowers white, berries scarlet. Cool walls; common soil. Seeds sown in open ground in November and by budding or grafting on the hawthorn.

ERCILLA BRIDGESIA SPICATA.—Chili. Ivy-like in its habit of growth. Flowers purplish, spring; sunny walls; common soil.

ESCALLONIA (Chilian Gum Box).—These handsome shrubs are liable to be damaged by frosts, and are only recommended for the warmer parts of the country. *E. floribunda*, New Grenada, height 10 feet, flowers white, July; and *E. macrantha*, Chiloe, height 3 to 6 feet, flowers red, June, are the best to plant. Position, south or south-west wall, ordinary soil. Cuttings of half-ripened wood in sandy loam under hand-glass; layers and suckers.

EUNONYMUS (Spindle Tree). The Japanese (*E. japonica*) varieties are handsome shrubs that succeed admirably against low walls and house fronts. *E. radicans* is one of the smallest and best. *E. aureo marginatus*, *latifolius albus*, and *latifolius aureus*, are good stronger-growing varieties, with larger, prettily variegated leaves. Common soil; short cuttings of matured wood inserted in the ground early in October.

GARRYA ELLIPTICA.—California. Height 8 to 10 feet. Flowers greenish white, spring. Position moderately warm, and well drained; ordinary soil; seeds in a cold frame in the autumn; cuttings of

half-ripened wood under hand-lights or cold frame.

HEDERA (Ivy).—For varieties see page 126.

MAGNOLIA GRANDIFLORA.—North America. For lofty walls. Flowers large, white, strongly scented, summer. Position sunny; loam, peat, or leaf soil and sand. Seeds in the spring or autumn; layering in summer or autumn and grafting on commoner species.

RHYNOSPERMUM JASMINOIDES (Chinese Jasmine).—Shanghai. Height 8 to 12 feet. Flowers white, sweet-scented, July. Warm, well-drained position; peaty soil. Cuttings of firm young shoots in peaty soil under bell glass in heat, during the spring or summer.

ROSA (The Rose).—See page 154 and "Rosaries."

SMLAX ASPERA (Prickly Ivy).—South Europe. An elegant climber, attaining a height of 5 feet. Prickly stems and heart-shaped leaves. Flowers whitish or flesh-coloured, berries scarlet or black. Warm wall; sandy loam. Seeds and by division in spring.

STAUNTONIA LATIFOLIA, synonym *Holboellia latifolia*.—Himalaya. Height, 20 feet. Leaves very large, flowers insignificant. Warm wall; ordinary soil. Cuttings of half-ripened wood under bell glass in cool place.

DECIDUOUS.

AMPELOPSIS.—*A. quinquefolia*, the true Virginian Creeper, is now being rapidly superseded by *A. tricuspidata*, better known as *A. Veitchi*, a Japanese species. Any aspect, ordinary soil. Layering and by cuttings of firm young shoots, 6 inches long, in sandy soil and gentle heat, or by firm wood in a cold frame or greenhouse in the autumn. Also by seed in the spring.

ARISTOLOCHIA.—See page 85.

BIGNONIA (Trumpet Flower).—*B. capreolata*, North America, a strong-growing, moderately free flowering climber. Colour orange, April to August. *B. radicans*, synonym *Tecoma radicans* North America. Height, 20 feet, clings to the wall, foliage handsome; flowers scarlet red, summer; south walls, peaty soil. Prune in the spring—weakly growths freely, the rest lightly. Cuttings of firm young shoots in heat and by layering in the autumn.

CHIMONANTHUS FRAGRANS (Japanese Allspice).—Height, 6 to 10 feet; flowers greenish white and purple, winter. Moderately warm walls, ordinary soil. Prune side shoots after flowering. Layering in the autumn.

FORSYTHIA (Japanese Golden Ball Tree).—*F. suspensa*, China and Japan. Height 6 feet. Flowers yellow, abundant in the spring. *F. viridissima*, Japan. Height 10 feet. Flowers yellow, March. Sunny walls; ordinary soil. Prune freely after flowering. Layering, and cuttings of firm wood under hand-light in the autumn.

JASMINUM (Jasmine).—*J. nudiflorum*.—China. Strong-growing. Flowers yellow, winter. Prune after flowering. *J. officinale* (Common White Jasmine), Northern India to Persia. Spreads rapidly. Flowers white; sweet-scented; June to September. There are also golden variegated and double flowering forms of this species. Prune early in the spring. *Jasminums* are not particular as to position or soil. Propagate by layering in the summer, and by firm cuttings in hand-lights or sheltered positions in the autumn.

KERRIA JAPONICA (Jews' Mallow).—Japan. Height 3 to 5 feet. Flowers yellow, single and double, spring and summer. An old-fashioned shrub succeeding well against latticed porches, low walls and fences. Common soil. Prune after flowering in the spring. Cuttings of young wood

- in sandy soil under a bell-glass or hand-light in the summer, layering in the autumn and division in the spring.
- LONICERA** (Honeysuckle).—See page 123.
- MAGNOLIA CONSPICUA** (The Yulan).—China. Height 20 feet. Flowers white, suffused with purple, February to May. Sunny wall, peaty soil. Light pruning after flowering. Layering in summer and autumn.
- MANDEVILLA SUAVEOLENS** (Chili Jasmine).—Flowers white, fragrant, June to September. South fronts in warm localities; loam and peat in equal parts with charcoal and sharp sand added. Prune in the spring; seeds in peaty soil, in heat, February. Short cuttings of young shoots in heat during the summer.
- PASSIFLORA** (Passion Flower), *P. cœrulea*.—Brazil and Peru. Flowers greenish white and purple, June to October, and the beautiful pearly white form, Constance Elliott; hardy in the south and sunniest positions; ordinary soil. Prune young wood severely early in the spring. Cuttings of young shoots in heat; layering in the summer.
- PYRUS JAPONICA**, synonym *Cydonia japonica* (Japanese Quince).—Height 5 to 6 feet. Flowers deep scarlet, and there is also a pinkish white form, February and March. Any position; ordinary soil. Prune after flowering. Seeds, by grafting on the quince stock, and layering in the autumn.
- ROSA** (The Rose), see "Rosaries" and p. 154.
- SOLANUM JASMINOIDES**.—South America. Rambling, twining habit of growth. Flowers white, summer, warm, sheltered position; ordinary soil. Cut back freely in the spring. Cuttings of young shoots in heat.
- WISTARIA SINENSIS** (American Kidney-Bean Tree).—China. Strong growth; flowers violet, May and June, sometimes flowering again in August, as in the illustration, Fig. 75, page 147. The white (*sinensis alba*), and the double (*flore pleno*), are desirable varieties. Sunny position, ordinary soil. Shorten lateral growth freely every spring. Layering growing shoots in the summer.

TENDER OR HERBACEOUS CLIMBERS.

When hardy trees and shrubs are first planted against walls there is usually room for a few quick-growing climbers. These can be raised from seeds under glass, and after all danger from spring frosts is past, planted for flowering during the summer and autumn months. It is important not to sow too early, too thickly, nor in too much heat, or weak-spindled plants will be produced. They should be sturdy by growing those of them which are raised under glass in a very light position, in a temperature of about 60 degrees, cooler at night, then will they flourish when planted out, whereas, if drawn up tall and weakly they will probably fail.

SELECTIONS.

- COBÆA SCANDENS**.—Mexico; growth rapid; leaves furnished with tendrils. Flowers purple, May to October. Sheltered, sunny position; ordinary soil. Seeds in heat, March and April. There is a handsome variegated form which is propagated by cuttings of young growth in heat.
- CONVOLVULUS MAJOR**, synonym *Ipomœa purpurea* (Bindweed).—Tropical America. Rapid twining growth; flowers purple shades, June to September. Sow early in April where the plants are to grow and flower, and thin out freely.
- ECREMEOCARPUS SCABER**.—Chili. Growth free, leaves furnished with tendrils. Flowers orange scarlet, July and August. Good for covering sunny walls and trellises; ordinary soil. Protect the roots with ashes in the autumn. Seeds in heat, March or April; plant out of pots in May.
- HUMULUS JAPONICUS** (Japanese Hop).—This annual and its variegated form are suitable for draping walls, verandahs and porches. Ordinary soil. Sow seed under glass in March or April, and plant out from small pots in May.

IPOMÆA.—*I. hederacea*, *I. h. limbata elegantissima*, purple, and *I. Quamoclit*, scarlet, are among the best in the annual section for sunny walls and trellises. Sow seed in heat, and turn out strong plants early in June.

LOPHOSPERMUM SCANDENS, synonym *Maurandya scandens*.—A quick-growing annual. Flowers purplish violet; summer. Requires a sheltered sunny position, and rich soil. Sow in gentle heat, March or April, planting out of pots early in June.

MAURANDYA BARCLAYANA.—A neat-growing twiner. Flowers, violet purple; summer. Sunny position; ordinary soil. Sown in February or March, plant out of small pots early in June.

MINA LOBATA.—A distinct half-hardy climber, adapted for walls, fences, or arbours; flowers, red and yellow, in November; requires a sheltered position. Sow under glass in April, establish in small pots and plant early in June.

TROPÆOLUM.—*T. majus* in variety, better but incorrectly known as Nasturtions, are of rapid growth and showy, but liable to overgrow choicer climbers. Inferior to *T. Lobbianum*, with orange

scarlet, and *T. perigrinum* (Canary Creeper), with small yellow flowers in abundance. Sunny positions and soil not too rich. Sow seeds in gentle heat early in April, and plant out during the first week in June.

TROPÆOLUM SPECIOSUM (Flame Flower).—This requires a special note. In Scotland and the North of England more particularly, its myriads of glowing crimson scarlet flowers produce a veritable "blaze of beauty." It is found also in several gardens in the south in more or less moist and shady positions, but not under trees. Increased by division of fleshy roots and must not be disturbed by digging. Often slow in attaining vigour, but when once established grows "like a weed," and when in the best condition produces an effect such as no other plant can equal. It is perfectly hardy, and plants can be had established in small pots, from nurseries. A small matter of considerable importance is the placing of twigs or sticks to the growths immediately they appear above ground, for keeping them upright; if they fall over they are prone to dwindle away.

ROSARIES.

SO much has been written about roses from time to time that it might be thought the subject was exhausted; but it has to be remembered that each year brings many new varieties, also thanks to the enormous number of cultivators of our national flower we are naturally improving in methods of culture; and it will be admitted that the great majority of lovers of flowers give the palm, for beauty, variety, and sweetness, to the queen of all—the rose.

Although roses may be freely utilised with other plants in the flower garden and shrubbery, they are seen at their best when a part of the garden can be devoted to them entirely. This is usually termed a rosary or, as latinised, rosarium; but the heading “Rosaries” is intended to be more comprehensive, and has reference to collections of roses, large or small, in accordance with the definition of the word rosary as “a bed of roses, or place where roses grow.”

The selection of position for rose cultivation is of greater importance than soil, seeing that the latter can be easily made suitable as explained in the remarks upon soils on a subsequent page. Roses like abundance of light and air, and yet need to be sheltered from strong south-west, keen north and east winds. A few trees, or high hedges, growing twenty or thirty yards away on the north and north-east, also on the south-west, are of great service in affording protection against heavy winds at a time when the plants are in full growth and bloom. But the trees must be sufficiently far away to allow the whole day's sun free access to the rosary. The success and beauty of a rose garden depends much upon arrangement; care should be taken not to place weak and strong growers side by side, nor to have a short grower at such a spot as would amply accommodate a variety of vigorous habit.

It is a difficult matter to give a plan of a rose garden that would be suitable for all persons. The space at disposal may not allow of the design being carried out, or there may be no walls or positions suitable for the climbing Teas and tender species. The accompanying plan is an ideal rosary, including almost all of the best

species and sections. The dimensions are two hundred feet square, and whether space admits of a larger or compels a smaller square than this, the same plan may be carried out to advantage.

The aspect should be north-north-east and south-south-west. On the west, north, and east sides are walls ten feet high. The outsides of these may be used for more

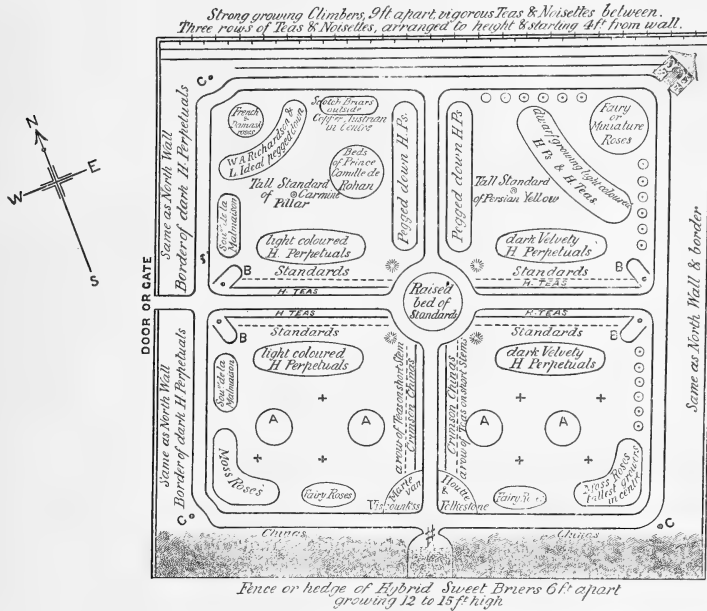


Fig. 77. PLAN OF ROSE GARDEN.

References:— \ddagger , Arbour covered with Ayrshire Roses; A A A A, tall weeping standards in centre of dwarf Hybrid Perpetuals; B B B B, Turner's crimson Rambler over iron arches; C C C, strong-growing pillar Roses; O, strong-growing bush Roses, needing stakes; *, Ayrshire and other strong growers; +, Rosa rugosa.

roses, if sheltered, or fruit trees of various kinds. The plan shows a door or gate on the western side, but this might be situated at any point most convenient. In order to break the south-west winds we have planned for a hedge of the beautiful and sweet-scented Hybrid Briars, which will very quickly form a strong fence that could not well be placed at any other point. In early summer these will invariably be a mass

of bloom, while their delicious perfume will pervade the garden throughout the season. In the centre of this hedge is an arbour, to be covered with free blooming Ayrshire Roses, such as Dundee Rambler, Ruga and Bennett's seedling. A row of the common Blush China and another of the dwarf-growing Crimson Chinas may be planted in front of the Briars, and will give a grand show of bloom when the Hybrid Sweet Briars are flowerless.

The south side of the north and west side of the east walls have the more tender climbing Teas and Noisettes, also Banksians, and others that will not stand a cold aspect, planted at intervals of nine feet; vigorous Teas, such as Marie Van Houtte, Anna Ollivier, Dr. Grill, and others, placed between these to fill up the base, supply bloom when the climbers are past, and are making new wood for next season's display. Four feet from the walls will be a row of Teas and Noisettes of the same habit of growth as those between the climbers; seven feet from the wall a second row of less vigour is placed, and a third row of short growers in front, one and a half feet from the walk, the borders being eleven and a half feet wide all round. The plants in the row nearest the path may be two feet apart, but three feet in the row is not too far for the others. The western wall may be planted the same, but here we have planned for dark-coloured Hybrid Perpetuals in the border, the three rows and distances to be the same as in the other side borders.

In the north-east corner is a summer-house. This may either be one of artistic beauty in itself, or rougher built and covered with Banksians, Fortune's Yellow, Bardou Job, and roses of similar habit. The raised bed of standards in the centre may have plants with four-foot stems in the middle, gradually falling off to about two-foot stems at the outsides. Beneath these, mignonette, Phlox Drummondii, or even carnations, may be grown to advantage. The standards, both in this bed and in the rows on each side of the path crossing from west to east, should be about three feet apart. Fairly strong-growing Hybrid Teas may be placed in a second row in front of the standards and alternately with them, such as Viscountess Folkestone, Caroline Testout, Grace Darling, and others of similar habit.

The ring of Fairy Roses opposite the summer-house should be planted thickly, say a foot or fifteen inches each way. The same distances may be kept for the Scotch Briars, but the Copper Austrians in the centre will need to be three feet apart. The pegged-down roses, both Hybrid Perpetuals and the crescent-shaped bed of Noisettes near the Damask Roses, require to be at least four feet each way. The

two corner beds of Moss Roses must be planted thickly, but we would not place the miniature mosses, such as Little Gem and De Meaux, in these beds, preferring them among the Fairy Roses on account of their similar growth. The bush or pillar roses on the north and east sides may consist of varieties like Mrs. Paul, Paul Néyron, Gloire de Dijon, or any extra strong grower. Three plants of the Rugosas may be placed in a triangle two or three feet apart, and will rapidly make a large bush of healthy foliage with bright blossoms and hips. Keep each bush true to its colour, the single white, semi-double white, and two shades of lilac and deep rose.

The corner roses, *e, e, e*, may either be Crimson Rambler and Claire Jacquier planted together for a beautiful contrast; Paul's Carmine Pillar and Bardou Job; or two good singles, such as Rosa lucida (red), and Rosa brunonis moschata (white). The two isolated standards should be on stems as tall as possible and allowed to droop over and bloom in long festoons. The remainder of the plan, with notes attached, explains itself.

Let the soil in the beds be good, apply a light dressing of stable manure in the autumn, and a stronger mulch of stiff manure early every spring. Raise the soil slightly in the centre of all the beds, and keep the grass carefully mown between. Roses never look better than when in beds with well-kept grass as a foil. The plan given includes all classes of roses of real merit, and allows each to be shown to advantage. One note of warning—grand as Her Majesty, Souvenir de Paul Néyron, Innocente Pirola, and a few more that are notoriously affected by mildew, undoubtedly are, we would relegate them to some other part of the grounds; for although the same atmospheric conditions prevail over the whole rosary, it often happens that these varieties contract the disease in a bad form and convey it to many others that would otherwise have escaped.

HISTORY AND PROGRESS OF THE ROSE.

Exactly three hundred years ago the old Provence or Cabbage Rose is supposed to have been introduced into this country. Our common Moss Rose was well known here at the same date, while two years later we find Rosa alba originating from a sport or seedling, probably a cross between *R. canina* (our native Dog Rose) and *R. gallica*, a variety from Southern Europe. With the advent of the Damask roses from Syria in 1573 our garden hybrids increased rapidly, and although few of these are now to be

found except in botanical collections and a few of our oldest cottage-gardens, they were sensational roses at that time. From more or less all over the world roses have been brought to this country, and even our own islands possess several very distinct and showy native species and varieties.

It does not seem quite certain where our old Blush Monthly Rose originated, but it was known here in 1789. *Rosa indica*, the common China, has given us an immense variety, two of the chief classes or sections being the tea-scented and noisettes, now classed together by most growers. We shall have a few words to say upon this later on when dealing with classification.

What school-child does not remember the history of the Wars of the Roses, and the pretty sentiment of the red and white roses amalgamating their colours at the same time as the two hostile houses were united? To this day, one of our most showy garden-roses is known as York and Lancaster, although more than one other variety is often confused with it.

A glance at the names of roses, whether old or newer varieties, calls to memory the most famous of our ancestors, and also a large number of notable persons still with us. It is during the last thirty years that roses have so greatly improved; but we had a few grand varieties previously, some of the best being Alfred Colomb, Charles Lefebvre, Beauty of Waltham, Camille Bernardin, Dr. Andry, Duchesse de Morny, Duc de Wellington, Fisher Holmes, Général Jacqueminot, Marie Baumann, Maurice Bernardin, Prince Camille de Rohan, Sénateur Vaisse, Xavier Olibo, Devoniensis, Madame Bravy, Maréchal Niel, Rubens, Niphotos, Souvenir d'Élise Vardon, Souvenir d'un Ami, Souvenir de la Malmaison, John Hopper, Madame Falcot, and Gloire de Dijon. This is a grand list, and all are still among our very best roses.

As the years went on, we obtained new varieties of sterling merit almost annually. The names are too numerous for citation, but as an example, a few of the best raised or distributed during the following five years may be mentioned:—Baronne de Rothschild, Comtesse d'Oxford, Dupuy Jamain, Louis van Houtte, La France, Catherine Mermet, Comtesse de Nadaillac, Marie van Houtte, Boule de Neige, and Paul Neyron. Good varieties came even more rapidly during the ensuing decade, but we must not attempt to name these, or there will be little space left for cultural and other notes.

Roses must always be popular, and in no country can they be seen in such perfection as England and Ireland. Our Continental friends may have better facilities for

hybridisation, but the Rose Congress held at Antwerp in 1894 clearly proved that British growers were a long way ahead of all others.

We propose to treat upon Classification, giving a few chief characteristics of each section; various methods of Propagation and Pruning; on Insects and Diseases, with methods of prevention and eradication; and also to give selections of varieties for various purposes and positions. Roses for exhibiting will be treated in the chapter on Florists' Flowers.

Our chief aim will be to help those with little or no knowledge, and in this endeavour we shall have the approval of experts, whose great desire is to increase the number of cultivators of the queenly flower they love so well.

CLASSIFICATION.

This is a very large subject if treated botanically, we therefore propose to leave out those classes in which the species or varieties are not generally grown, and to treat more fully upon the others.

PROVENCE ROSES.—These owe their origin to *Rosa centifolia*, a native of the Caucasus. Our Cabbage Rose belongs to this class. All the varieties are very hardy, sweetly scented, generally of dwarf growth, prefer a rich, deep loam, and need close pruning. Provence Roses do best upon their own roots, and are propagated from suckers and cuttings. There is a section of this class producing very small blooms and the plants are exceedingly dwarf in habit. They are pretty for edgings to beds and for pot work.

MOSS ROSES.—These are supposed to have originated from a sport out of one of the Provence Roses, and known as *Rosa centifolia muscosa*. All growers are acquainted with their characteristic glandular-mossy peduncles and calyx. They need the same treatment as the Provence.

DAMASK ROSES.—Syria is the home of these roses, which were introduced to this country in 1573, and are the parents of many beautiful garden varieties. Both these and the Provence are much used in the East for the distillation of rose-water. The calyx and peduncles are slightly hairy and sticky, the foliage light green and standing out stiffly. These and the French, or Gallica Roses, have been crossed and recrossed with other classes to such an extent that they have been incorporated under the heading of Hybrid Perpetuals, or, as the French growers have it, Hybrid remontant, a better term than ours, many of the varieties being far from entitled to the name perpetual.

HYBRID PERPETUALS.—These are distinct in growth and foliage, the leaves being larger, stiffer, and more rugose (wrinkled) than are those of Teas and Noisettes. They also comprise our darkest roses, in fact, all rose shades and colours, with the exception of yellows and orange shades. Some fifteen hundred varieties have been named, but three-fourths of these are seldom grown now, and year by year are being improved upon.

TEA-SCENTED ROSES.—These sprang from *Rosa indica* as the result of various crossings. They are remarkable for delicacy of perfume and softness in colour, and have smooth glossy leaves. Of late a few deep-red-flowered varieties have been introduced, but the general shades are yellow, bronze, pink, copper, and white. In some flowers these are produced separately, and in others a combination of several tints is found, but always melting into one another in the most pleasing and delicate way. The growth of the Tea-scented Roses is also distinct from all but the Noisettes, clearly showing their Chinese origin. For some years these two classes have been approaching each other so closely that at present it is impossible for even expert judges in some cases to define one from the other, and the National Rose Society, with most large growers, has decided to amalgamate the two classes.

NOISETTE ROSES.—*Rosa Noisettiana* was probably a natural cross between *R. indica* and *R. moschata*, originating in America and being sent to France from there in 1815 or 1819. This was sent from Monsieur Noisette to his brother, a Parisian florist, and hence the name Noisette. We look upon this as the more correct origin of the name, so many of the earlier varieties not flowering in bunches "similar to the hazelnut," as has been claimed. Nor did they long retain the extra vigorous growth of the first few varieties, while many Teas soon sprang up with equally long and vigorous growth.

We might select a variety or two from each class to point out how confused they have now become. *Caroline Kuster* and *Rêve d'Or* are of very opposite habit, yet both are Noisettes. *Gloire de Dijon* and *Souvenir de Paul Néyron* from the Teas afford two more striking examples, and it would be only too easy to quote a dozen or more of similar cases. For climbers, both in the open and under glass, Tea and Noisette Roses are admirable, also for growing in pots for early forcing, while few classes have been so extensively added to and improved. Moreover these long-assumed tender roses are, as a class, as hardy as most others, while experience proves them at least equally capable of recruiting strength and vigour after a severe ordeal. They are absolutely free from the disease known as red rust (for description of which see notes on Diseases and

Insects), and are decidedly more entitled to the term perpetual than those classed as Hybrid Perpetuals.

HYBRID TEAS.—From the frequent crossing of varieties from various classes, a new race of roses has resulted. These are now known as Hybrid Teas, and are generally hybrids from Teas and Noisettes crossed with Hybrid Perpetuals. In habit they partake of both classes, are exceedingly floriferous, and promise to develop into the most useful of all. Unfortunately many of them are subject to red rust.

BOURBON ROSES (*Rosa borbonica*) probably resulted from crossing *R. indica* and *R. gallica*. This is not an extensive class, but contains a few good varieties in Mrs. Paul, Souvenir de la Malmaison, and Madame I. Perière; they are generally best in the autumn. Hybrids of Bourbon, China, and Noisette classes, are also too much intermixed for it to be worth while to keep them separate here. They include some of our best old climbers, such as Blairi No. 2, Charles Lawson, Coupe d'Hébé, Madame Plantier, and others, which are very vigorous, need little pruning, and rarely flower more than once during the season.

AUSTRIAN BRIARS (*Rosa lutea*).—These were grown in England as long ago as 1596, and it seems uncertain how long previously. They are vigorous, of peculiar growth and perfume, and only need a little summer pruning to remove wood that has already flowered.

SCOTCH AND SWEET BRIARS are natives, but hybrids of Sweet Briars, crosses between Teas, Hybrid Perpetuals, Austrian Briars, and others, effected by Lord Penzance, form a new class of the last few years. They retain the sweet-scented foliage of the old sweet briar, are of remarkably vigorous growth, much larger and brighter in colours of the flowers, very floriferous, mostly single, and evidently have a grand future before them.

AYRSHIRE ROSES.—From their extremely vigorous growth these are admirably suited to wander over coarse roots and banks; to hide ruins and unsightly corners. No pruning is needed, they may be left entirely to themselves.

EVERGREEN ROSES.—These are somewhat similar, but the term evergreen is not more applicable than to the Banksians and Ayrshires, also the hybrids of *Rosa scandens*.

JAPANESE ROSES (*Rosa rugosa* or *R. ferox*).—These are peculiarly rugosed or wrinkled on the surface of the foliage, have an immense number of long prickles, single or semi-double blossoms, flower both early and late, and carry extra large hips throughout the season.

FAIRY OR POLYANTHA ROSES.—These are very dwarf, exceedingly free flowering, semi-double, and each bloom seldom exceeds the size of a shilling. The climbing polyanthas are extra vigorous, and include *Polyantha grandiflora*, Turner's Crimson Rambler, Claire Jacquier, and others. *Rosa multiflora* is sometimes called *Polyantha simplex*, and *R. multiflora grandiflora*, *P. grandiflora*. We note this because the Polyanthas have become a little confused in consequence.

For cultural purposes it is not necessary to dwell on any other classes than those described, though some may possibly be referred to incidentally.

SELECTIONS OF ROSES FOR VARIOUS PURPOSES.

Before planting it is most important to select those varieties which are best adapted for the particular object in view. Especially in beds, is it necessary to either have all of a given height or else to so arrange that the taller growers may occupy the centre. On walls we can place strong growers with a bushy habit and those making long rods together; indeed, this is by far the best plan, as we thus cover the lower portions of the wall or fence, and can allow the longer growths to occupy the upper portions. In naming a few of the best for walls and fences, it is recommended that Section II. be placed alternately with those named in Section I. There are many other varieties well suited for the purpose, but it is our object to give as much variety of colour as possible in lists that shall be of service to the majority of cultivators.

The letters following the names of the varieties indicate the classes to which they belong: thus, A. Ayrshire; B. Bourbon; C. China; N. Noisette; P. Polyantha; T. Tea-scented; H.P. Hybrid Perpetual; H.T. Hybrid Tea.

SECTION I.—*Robust growers that make extra long shoots.*

GLOIRE DE DIJON (T.).—A well-known buff rose, very sweet and hardy.

CLIMBING NIPHETOS (T.).—Pure white, robust grower, and fairly free bloomer.

L'IDÉAL (N.).—Yellow and metallic red, tinted with deep golden yellow. Most distinct, and one of the best and sweetest-scented roses grown.

MADAME BÉRARD (T.).—Fawn yellow, brighter in the autumn, very distinct, and with handsome foliage.

RÊVE D'OR (N.).—A clear buff yellow. Very hardy, and almost evergreen. Objects to much pruning.

WILLIAM ALLEN RICHARDSON (N.).—Very deep orange and yolk of egg colour; variable; perpetual blooming and one of the best.

CHESHUNT HYBRID (T.).—Cherry carmine; opens well, is hardy and free.

REINE MARIE HENRIETTE (T.).—Deep red; much like the former, but brighter and better in the bud.

CRIMSON RAMBLER (Hybrid Polyantha).—Bright crimson; very vigorous, and blooming in immense pyramidal trusses.

SECTION II.—*Strong growers that do not make extra long shoots.*

ANNA OLLIVIER (T.).—Rosy flesh and buff; very large and full.
 CATHERINE MEHMET (T.).—Light rosy flesh, large, good, and very sweetly scented.
 THE BRIDE (T.).—A pure white sport of the above, and always good.
 MARIE VAN HOUTTE (T.).—Pale yellow, tinted with deep rose towards the autumn.
 DR. GRILL (T.).—Rose, shaded with copper, exceptionally free blooming.
 FRANCISCA KRÜGER (T.).—Coppery-yellow with peach shadings.

MADAME FALCOT (T.).—Deep apricot; one of the most charming roses in the bud.
 RUBENS (T.).—White, tinted with cream.
 PERLE DES JARDINS (T.).—Deep yellow, large, and with bronzy crimson foliage.
 SUNSET (T.).—A deep apricot-coloured form of the above.
 SOUVENIR DE THÉRÈSE LEVET (T.).—Brownish crimson, free.
 MADAME LAMBARD (T.).—Red early in the season; clear salmon towards autumn; always opens well.

SELECTION FOR ARBOURS.

Some useful varieties for this purpose have been mentioned in a previous chapter (page 125). The following are also excellent for the purpose. Some of them bloom in clusters of small flowers; others are large, but all grow luxuriantly in good soil.

ALLISTER STELLA GRAY (P.).—A yellow companion to the above, smaller than William Allen Richardson, and of somewhat similar shades; a continuous bloomer.
 BARDOU JOB (H.T.).—Semi-double, very large petals of bright shaded crimson.
 RUBRIFOLIA.—Small red flowers, the wood and leaves being very high-coloured and ornamental.
 THE GARLAND (A.).—Nankeen, pink and white; a small semi-double variety, and particularly good for exposed positions.
 ROSA MULTIFLORA GRANDIFLORA.—A most rampant climber, with large, pure white blossoms.

REINE OLGA DE WURTEMBERG.—Bright red; a grand rose with magnificent foliage.
 POLYANTHA GRANDIFLORA.—Pure white; will cover space very quickly and is hardy.
 MADAME ALFRED CARRIÈRE (T.).—White, with a yellowish base, large, and very sweet scent.
 RUGA.—Pale flesh, very sweet, and with glossy foliage.

Other varieties with larger blossoms are:—Reine Marie Henriette (red), L'Idéal (yellow-red), Rêve d'Or (deep buff), Cheshunt Hybrid (red), Climbing Niphetos (white), and Gloire de Dijon (buff); all of which have been described.

FOR BEDS AND PEGGING DOWN.

Here we make three sections: the first consisting of strong growers producing a quantity of bloom on the whole length of the previous season's growth, and that carry their flowers well above the foliage: the others as indicated in italics.

SECTION I.

BOULE DE NEIGE (H.P.).—Pure white, a charming and almost ever blooming rose.
 CHARLES LÉFÈVRE (H.P.).—Brilliant velvety crimson, large double and of grand form.
 CHESHUNT SCARLET (H.P.).—Vivid crimson and scarlet.
 DUKE OF EDINBURGH (H.P.).—Bright vermilion, extra good.

HER MAJESTY (H.P.).—Clear satiny rose and pink, an immense bloom.
 MADAME GABRIEL LUZET (H.P.).—Light silvery pink; very beautiful, and one of the best for this purpose.
 MAGNA CHARTA (H.P.).—Bright rose, large and very double.
 MARGARET DICKSON (H.P.).—White with a pale flesh

centre; quite the best nearly white rose we have for pegging down.

Monsieur BONCENNE (H.P.).—Very dark velvety crimson; a hardy rose that invariably succeeds.

THOMAS MILLS (H.P.).—A deep scarlet carmine.

Mrs. PAUL (H.P.).—An immense grower; blush

white with rosy peach shadings; a large, stout-petalled and peculiarly shaped bloom.

MADAME ISAAC PERIÈRE (B.).—A large and double flower of a vivid carmine; stout petals and of good form; very hardy.

SECTION II.—*Varieties of uniform growth that need to be pruned somewhat closely.*

GÉNÉRAL JACQUEMINOT (H.P.).—Brilliant crimson; a well-known favourite; very fragrant.

BARONNE DE ROTHSCHILD (H.P.).—Deep flesh pink; fine, but not fragrant.

COMTE DE RAIMBAUD (H.P.).—Dark carmine and cerise; a beautiful colour and free blooming.

COMTESSE D'OXFORD (H.P.).—Deep carmine red; an excellent rose.

FISHER HOLMES (H.P.).—Crimson, shaded with maroon and scarlet.

JEANNIE DICKSON (H.P.).—Silvery rose; blooms borne on stout stems.

Mrs. JOHN LAING (H.P.).—Soft, clear pink; an

abundant bloomer, and one of the very best roses.

LA FRANCE (H.T.).—Silvery on the edges with a deep rose centre; a wonderful bloomer and very sweet.

MADAME VICTOR VERDIER (H.P.).—Clear, light crimson; an established favourite.

PRINCE CAMILLE DE ROHAN (H.P.).—Almost the blackest rose we have, a free bloomer, always of good shape and very sweet.

VICTOR HUGO (H.P.).—Brilliant crimson, shaded with purple, a very bright and attractive rose.

VISCOUNTESSE FOLKESTONE (H.P.).—Flesh white, a free bloomer, and exceptionally sweet-scented.

SECTION III.—*Varieties that only make short, compact growth, and which need planting closely together. Useful also for edgings of rosaries.*

DUCHESS OF BEDFORD (H.P.).—A large bloom, rich velvety crimson, shaded with scarlet; perfect.

ETIENNE LEVET (H.P.).—Carmine red, very large and effective.

GUSTAVE PIGANEAU (H.P.).—Bright-shaded carmine, always of good form, and one of the largest roses.

MABEL MORRISON (H.P.).—A pure white Baronne de Rothschild.

HON. EDITH GIFFORD (T.).—White with flesh centre, good both in bud and expanded.

CAMOENS (H.T.).—Glowing rose, with a shade of yellow at the base; the buds are long and pointed.

LADY MARY FITZWILLIAM (H.T.).—Soft rosy flesh, very large and distinct; good.

WHITE LADY (H.T.).—A pure white form of the above.

The following varieties are even less robust, and mostly produce clusters of miniature blossoms all through the season:—

CRAMOISIE SUPÉRIEURE (C.).—Velvety crimson, very free.

FABVIER (C.).—Dazzling crimson scarlet, very good.

LITTLE GEM (Pompon).—A crimson moss rose of short growth and very small flowers.

ANNA MARIA DE MONTRAVEL (Polyantha).—White, semi-double, very sweetly scented.

CÉCILE BRUNNER (P.).—Blush, shaded with pale pink.

GLOIRE DE POLYANTHA.—Deep rose with a white base.

PERLE D'OR (P.).—Nankeen yellow with deep orange centre; very distinct and novel.

MA CAPUCINE (T.).—Bronzy yellow with red shadings; most distinct.

STANDARD ROSES.

The most essential point in selecting varieties to grow in standard form is to keep entirely to those of free growth. None of the weak growers will thrive long as standards; they do not seem to possess sufficient strength to draw enough sap through

the stem of the Briar stock, and consequently dwindle away in the most disappointing manner.

Some of the extra strong growers are highly attractive when grown in this form, and their long shoots are allowed to droop over with the weight of blossoms invariably produced. In addition to those named under the heading of Pegged-down Roses, the following are good, but need ample space and should be cultivated on taller stems than the medium or free growers.

AUSTRIAN COPPER BRIAR. — A beautiful metallic yellow, with copper and orange shadings.
 PERSIAN YELLOW. — Deep primrose yellow.
 HARRISONI. — Deep golden yellow, semi-double.
 AMÉE VIBERT. — Pure white, small, produced in large clusters.
 CELINE FORESTIER. — Pale yellow with deeper centre ; very free blooming and constant.
 LAMARQUE. — White, with lemon centre, large, very sweetly scented, and also wants a warm situation.
 OPHIRIE. — Nankeen yellow and copper, a good autumnal bloomer.
 TRIOMPHE DE RENNES. — Canary yellow, large and exceptionally sweet-scented.

ACIDALIE. — White, a free and constant bloomer.
 PINK ROVER. — Very pale pink, one of the sweetest scented roses we have.
 CLAIRE JACQUIER. — Small flowers of nankeen yellow, borne in large clusters.
 CHENEDOLE. — Bright red, and a robust grower.
 MADAME PLANTIER. — Pure white, and very floriferous.
 COUPE D'HÉBÉ. — Deep pink, beautifully cupped blooms.
 YELLOW AND WHITE BANKSIAN ROSES. — These are very attractive when grown on tall stems and allowed to fall over at will, but they need warm situations.

All free growers, *i.e.* those which make a succession of fairly strong growths, will thrive as standards, the Tea-Scented and Noisettes being especially good in this form owing to their superiority in growing and blooming throughout the season.

Some of the best Teas and Noisettes are :—Anna Ollivier, Caroline Kuster, Corinna, Dr. Grill, Elise Fugier, Ernest Metz, Francisca Krüger, Homer, Jean Ducher, Madame Charles, Madame de Watteville, Madame Hoste, Marie Van Houtte, Medea, Rubens, Perles des Jardins, Safrano, Sunset, and The Bride.

A few good HYBRID PERPETUALS are :—Mrs. John Laing, Général Jacqueminot, Duke of Edinburgh, Abel Carrière, Boule de Neige, Charles Lefebvre, Comtesse d'Oxford, Dupuy Jamain, Heinrich Schultheis, Prince Arthur, Prince C. de Rohan, Ulrich Brunner and Susanne M. Rodocanachi.

HYBRID TEAS :—Augustine Guinoisseau, La France, Captain Christy, Caroline Testout, Grace Darling, Gustave Regis, Marquis of Salisbury, and Viscountess Folkestone.

ROSES FOR TOWN AND SUBURBAN GARDENS.

We cannot do better than choose from those varieties already named :—Gloire de Dijon, L'Idéal, Rêve d'Or, Cheshunt Hybrid, Marie Van Houtte, Madame Lambard,

Felicité Perpetué, Polyantha Grandiflora, Boule de Neige, Duke of Edinburgh, Monsieur Boncenne, Général Jacqueminot, Baronne de Rothschild, Fisher Holmes, Mrs. John Laing, La France and Viscountess Folkestone, forming a good selection.

For cutting from for home decoration, the varieties just named are excellent, but the following six others may be added:—Hon. Edith Gifford, Ruga, Longworth Rambler, Allister Stella Gray, William Allen Richardson, and Anna Ollivier.

PROPAGATION.

The methods of increasing roses are numerous, and those adopted should depend upon the purpose for which the future plants are intended; also whether it is desired to increase existing varieties, or raise seedlings. Roses may be grafted in several forms, budded, obtained from suckers or partitions of the roots, and from cuttings. It is also possible to propagate from matured eyes or buds in much the same way as is practised with vines.

SEED.—The seeds of roses may be sown as soon as ripe, but we prefer sowing early in the year, say February, after the heps have been stored in dry sand for a few weeks. Care must be taken that mice or birds do not eat them, either while in the sand or when sown. Crush the heps between the fingers, and distribute the seeds among the sand. Prepare a shallow pan or box of light loam, leaf-soil, and sand, in equal proportions, well drained, and the surface made level and fairly firm. Now sow the sand and seed together. A very slight covering of fine soil is all that is needed; but, previous to sowing, be careful that the soil is fairly moist.

A minute insect often attacks the seeds just as germination is completing, to avoid which, and other insects, as well as seedling weeds, it is recommended that the prepared pan of soil be immersed in very hot water an hour or so previous to sowing the seed. Place a sheet of glass over the whole, and stand the pan or box in a cool and moist corner of the greenhouse, or in a frame or pit. A slightly-heated greenhouse is best. Some seeds will spring much earlier than others, and the sheet of glass should not be hastily removed. As the seedlings appear allow more light and air, attending carefully to watering. When large enough, and especially if they are coming up thickly, lift out the most forward, and transplant into deeper boxes or pans. Placing three or four around a 5-inch pot is a convenient and good plan.

In early June they may be transplanted in a prepared border, in a sheltered position, placing them about a foot apart each way. Some will flower the first year,

and all during the next summer; but never discard a seedling from the first blooms. They may vastly improve with a few more months' growth. Protect during the first winter, or lift and place thickly in a cool frame, replanting them the following spring, when they may have richer soil, and be placed nearer or closer together, according to the habit of growth already developed.

CUTTINGS.—These are resorted to both for raising stocks suitable to bud or graft other roses upon, and also for increasing the number of any desired varieties in that way. Cuttings emit roots readily in the open ground, if inserted two-thirds or three-fourths of their length in sandy soil. They should be obtained from three-parts ripened wood of the same season, and made 6 inches long if of rose growths and intended to be grown into flowering plants; but 9 inches if stocks are desired for future working. The rose cuttings will need none of the dormant eyes removed; but in case of stocks for budding all but the two top eyes should be carefully cut out. Only strong-growing varieties are suitable for this method of propagation. Rose cuttings and their insertion are shown in Fig. 78. We repeat they should be made from firm, stout, summer shoots as soon as the leaves can be shaken off in the autumn, placed at once in the soil, deeply and firmly, and they will emit roots in the spring: if only inserted an inch or two deep, in the spring few, if any, will grow.

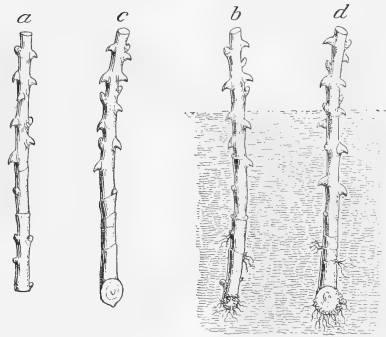


Fig. 78. ROSE OR BRIAR (AUTUMN) CUTTINGS.

a, Cutting prepared; *b*, the same inserted; *c*, slip or cutting with a heel; *d*, the same inserted and rooting.

The best dwarf stocks are obtained from the Manetti, the Briar, and De la Griferaie. They are made and planted exactly the same as currant and gooseberry cuttings, or, as shown in the preceding figure, after every bud, except two at the top, is cut clean out. After remaining a year they may be transplanted, again closely examining the stocks for dormant buds near their base. This time they should not be planted deeply, a couple of inches above the collar being ample. Rows may be from 2 to 3 feet apart, according to the strength of the roses it is intended to work upon the stocks, and the latter from 9 to 15 inches in the rows.

Cuttings of partly ripened growth (Fig. 79), especially when obtained from Teas and Noisettes growing under glass, are readily struck at any season. Take off a piece with a heel, a cutting three inches long is sufficient; do not remove more than the bottom leaf as indicated, and then insert to the cross mark in a sandy compost, sprinkle well and keep them close in a case or box in the greenhouse. If cuttings are scarce, those made with one joint within the soil and one leaf or bud above it suffice; or in other words, severing the shoot at the cross line in Fig. 79, removing the lower leaf, and inserting to the leaf above. They must be kept from direct sunshine, and quite close to prevent the leaves flagging until roots form, after which gradually expose, then pot, and grow the young plants in the ordinary way. Plants so raised flower freely, but we seldom get such fine blooms as from those upon foster roots of greater vigour.

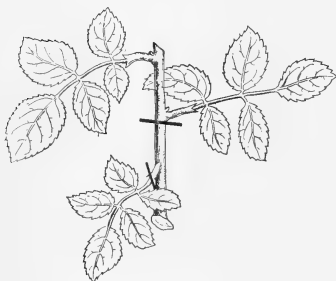


Fig. 79. ROSE (SUMMER) CUTTING.

BUDDING. — This is the chief method of propagation upon stocks, especially in the open ground. The same method is employed with all classes and upon all stocks. The seedling briar makes an excellent stock, and usually gives deeper colour to the dark red roses. A two-year-old seedling briar with a circumference of half-an-inch at the collar is quite large enough to plant out for budding upon the same year.

They may be planted as recommended for the rooted cuttings and rapidly swell sufficiently to accommodate the rose-buds when ready. Shallow planting of dwarf stocks is advised so as to admit of the rose-bud being worked close upon the roots; thus avoiding so many suckers and the necessity for such deep planting as was the case when stocks were raised in the cutting beds.

Budding is a very simple operation in itself, but not so easy to describe. A dwarf stock is budded in exactly the same way as our illustration of a standard briar, the bud being worked close down upon the crown of the roots instead of well up to the main stem of the standard. The stocks should be partly ripe, but still with sufficient flow of sap to allow the bark to lift easily and without injury. The condition of the rose growth from which the bud is to be obtained should be similar. As a rule, when the prickles will snap off easily, both stock and rose growth are in the right stage.

July and August are the most suitable months to bud roses, and the best buds are obtained from a shoot that has carried a good bloom.

The selection of buds is important. Do we not see the same characteristic of one plant reproduced in its offset? We bud or graft a piece of growth that may have sported in some favourable form, and expect it to, more or less, perpetuate the freak, yet very little care is usually exercised in the selection of buds, and guarding against taking them from a weakly plant, or one producing indifferent blooms of its particular variety. Choose the buds, then, from a shoot bearing a good representative blossom.

Fig. 80 illustrates a piece of rose growth, with buds in various conditions. The bud *a* is too forward, and the seat would probably tear away when removing the small portion of wood; *b* is too young; *c* gives us a bud in the right stage and shows the method of detaching the same. Do not bring the knife quite through the bark at the base of the bud, but tear away a strip so that when removed it represents *d*. The advantage of this is found when removing the small portion of wood covering the seat or root of the rose bud. Turn back the bark, and with a slight jerk detach the piece of wood, when, if the bud be in the proper condition you will find the root of the bud very prominent, and evidently well suited to rest on the wood of the foster stock.



Fig. 80. CHOOSING AND TAKING OUT ROSE BUDS.

a, Too advanced; *b*, too weak; *c*, right stage, and partly cut out; *d*, removing wood before insertion in stock.

To prepare the stock, make a cut with the point of a knife: two and a-half inches long is sufficient. Do not cut deeper than just through the bark, and then lift the bark gently with the bone-handle of your knife or a piece of thin wood. The less you disturb the thick, sticky sap below the bark the better, and the quicker and cleaner the whole operation is performed the greater are the chances of success. Slip the prepared bud beneath the raised bark, and then slide it down as nearly as possible to the base of the dwarf stock, or close to the main stem of the standard briar; *c* and *d* in Fig. 81 will explain this. It only remains to tie in the bud, avoiding constriction and leaving the eye, *e*, exposed.

In about three weeks the bud will have taken, or died; in the latter case bud on another branch of the standard briar, or carefully insert a second upon the opposite side in case of dwarf stocks. Never mutilate the growth of any stock just previous

to budding; indeed, we avoid any interference as much as possible, until the autumn or early spring when pruning. Then cut away all growth of the stock beyond the inserted bud, and you will soon have a promising plant, as represented in Fig. 82; but if the buds are inserted too far from the stem a calamity may occur the following season in the rose growth being blown out; if the bud is close to the stem and the growth further supported as shown, a safe and permanent union of the rose growth with the briar is soon effected.

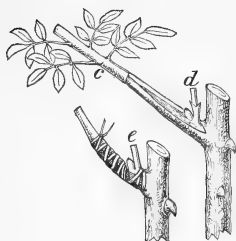


Fig. 81. INSERTING (*d*) AND SECURING ROSE BUDS (*e*).

GRAFTING.—This method of increasing roses is much more practised than formerly, and is easily explained by the aid of a few sketches. In Fig. 83 we have a plan known as whip or side grafting. The rose wood needs to be dormant in this case, and the close of the year is an excellent time for the operation. Pot some dwarf stocks, or lift a few and place in light soil under cover for a couple of weeks, then shake away the soil and graft as illustrated, once more getting the rose growth as closely upon the roots as possible. Pieces of briar root may be used as stocks, when suckers will be entirely avoided. Prepare the graft or scion as shown at *a*. It is well for the novice to cut a little tongue or slit upwards at *d*, and after cutting away the stock *b*, to make a corresponding, but downward, cut at *e*. Both the graft and stock are cut away so as to fit truly, and when placed together should be as represented in *e*. The lower end of the graft must come well down to the bottom of the cut upon the stock, and if slightly overlapping as at *f* will be better. It is here that a junction first forms, and if not well-cemented together at this point, decay may set in. Tie together firmly, then pot and keep close in a propagating case with a slight bottom heat, and a top temperature of 65° to 70°.

Fig. 84 shows a second method, and one generally practised when the stocks are in sap, and the rose growth less matured. After cutting off the top of the stock, make a cut and lift the bark similar to budding,



Fig. 82. ROSE GROWTHS FROM BRIAR STOCK.

a, Growth near the stem, and supported; *b*, too far from the stem, and blown out.

and as shown in *d* and *e*. The graft *a* should be prepared with a seat *b*, that when pressed under the lifted bark will rest upon the top of the stock as illustrated at *b* and *e*. Tie together and treat as before. When young growth has reached about two inches, gradually admit light and air; having previously kept them quite dark and close, when clay, moss, grafting-wax, and other means of keeping the wounds moist and air-tight will be quite unnecessary. After-culture is only the ordinary routine, and will be mentioned in due course.

It is not a bad plan to graft the more delicate Teas and Noisettes in this way, and then plant them in the open borders early in June. We save a year while the bud would be lying dormant, and secure a fairly large plant the same autumn, as well as a good show of late blooms.

The propagation by suckers or offsets needs few words. It is chiefly practised with

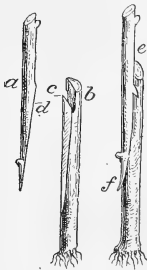


Fig. 83. SIDE-GRAFTING ROSES. (See text.)

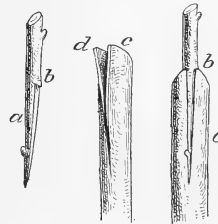


Fig. 84. SLIP-GRAFTING ROSES. (See text.)

the Provence, Mosses, Scotch and other briars, with a disposition to form suckers in much the same way as the raspberry. Be careful, if propagating from a budded or grafted plant, that the sucker is really a rose and not the Briar stock on which the rose was established.

SOIL AND PLANTING.

Roses will grow in almost any soil, but the most suitable is a deep, rich and rather heavy loam. It is not difficult to render any ordinary soil suitable by adding clayey loam to sandy soil; and light, opening materials, such as wood-ashes, soot, leaf-soil and thoroughly decayed stable manure, to soils of a naturally stiff nature. A little trouble in this connection is well repaid. It is also necessary to consider soils in relation to the stocks our roses are to be worked upon. The Briar stock, in any

form, prefers a stiff soil, while the Manetti and De la Grifferaie thrive best upon a light, sandy loam. Teas and Noisettes should always have the Briar as a stock, and a light ground must be prepared for them by adding heavier soil and close manures.

Should the soil be naturally wet it must be drained, the drain pipes being placed at least three feet below the surface, and a few pieces of broken bricks or other rubble spread over them. The preparation of the soil is important; bastard-trenching (page 50) meeting with most favour among successful exhibitors of the Rose. Not much manure is placed in the bottom trench, experience proving that periodical mulchings are of greater benefit and have not the same tendency to encourage coarse tap roots.

PLANTING.

When the plants are received from the nursery all bruised roots should be cut away from the under side upwards with a sharp knife. The coarsest of the roots may be shortened back half-way, and if much wood is present it will be well to reduce this also. The object is to induce a greater number of fibrous roots, and reduce the strain a large quantity of wood would be upon roots established in the soil. A spell of frost and drying winds are a great trial to newly moved plants.

Always look over the plants thoroughly in case a few suckers from the stock may have developed. This is most essential in the case of standard and half-standard Briar stocks, in which case it is impossible to avoid more or less suckers from the coarser roots.

Standards may be planted the same depth as before, but dwarfs are better with the junction of rose and stock placed two inches below the surface, as shown in Fig. 85, in which the long shoots are also marked, for shortening in the spring. Avoid the direct contact of manure with the roots, plant firmly, and stake all standards and large plants at once. Wind-waving is very injurious and must be avoided from the first.

The distance from plant to plant depends entirely upon the growth of each variety. Dwarf-growing Polyanthas and Fairy Roses, also a few of the weaker-growing Teas and Chinas, need massing closely together to produce a good effect; say a foot or fifteen inches apart each way. Ordinary growing bush roses will do well at twice that distance, while the extra vigorous kinds need to be at least three and a-half feet apart. The same remarks apply to standards and climbers, the great differences in strength of growth must be duly considered if uniform results are to be obtained.

PRUNING AND PROTECTING ROSES.

The mode and extent of pruning not only depends upon the class to which the roses belong, but also to the peculiarities of each variety. It is obvious that with varieties producing growths ranging from 1 to 15 feet in length, all cannot be pruned upon the same lines. Many varieties commence growth as soon as mild weather prevails, often giving the amateur an impression that he is behind in this most important operation. Unless judicious pruning be attended to each season, many, in short almost all our roses fail to give a good show of bloom. Not only is this the case, but plants get unsightly in shape, and carry so much old and sere wood that few healthy growths with their correspondingly good blooms are produced.

SPRING PRUNING.—When to prune roses is a somewhat vexed question with many growers, but experience points to March for Hybrid Perpetuals, Bourbons, and other hardy classes, and early April for Teas, Noisettes, Chinas, Banksians, and those of a more tender constitution. The ideal time for spring pruning is when growth is starting after the last frosts of any severity. This is, of course, a difficult matter to judge, and much depends upon the season, also whether the locality be north or south, and the varieties early or late in commencing growth. Moreover, so many varieties now grown have some peculiar characteristic of their own that needs consideration if the best results are to follow, that pruning has become quite an art in the successful culture of the rose.

We would warn against too early pruning in the spring. Roses commence to grow from the tip of their shoots first. Such growths seldom produce good blooms, being as a rule checked by late frosts. If allowed to come on naturally for a short time they induce a free start of new roots, and the little loss of sap caused by later pruning does no material harm. In the warmest positions and under the most favourable conditions we would not prune until early in March. It is very essential that the young growth should come on without any checks, these, whether from frost or chilly weather, being especially injurious to roses. A later break of new growth, free from checks, will rapidly catch and pass any plants that were pruned early, and which at one time seemed on the way to produce the earliest blooms.

Roses that were planted from nursery rows during the preceding autumn, should be



Fig. 85. PLANTING AND SHORTENING.

pruned about a week earlier than established plants in the same position. They should also be pruned harder, cutting away almost the whole of their wood (as shown at the cross bars in Fig. 85), this wood being of no use, but rather detrimental, in the case of newly-planted roses. By pruning these severely free growth is secured, whereas if the long growths were not cut back the plants might die. When plants are turned out of pots and planted in the open ground without shortening the roots, these last remarks do not apply. As such plants are frequently used to fill in blanks among established plants, they may be pruned the same as others that are established in the bed.

SUMMER PRUNING.—This is of great importance, especially among strong-growing climbers, and those which are cultivated under the system known as pegged-down Roses. The main object in these cases is to remove wood that has already flowered and thus concentrate more of the plant's energies into the better production of those long growths that will be needed for next season if a grand display of flowers is to be had. In many instances the strong growers need considerable thinning-out in order to give the necessary room for new growths without these being over-crowded. Once a long rod of growth has flowered from almost every bud throughout its length, there is little use retaining it. A wall or fence that is fully covered with rose growth should be carefully gone over as soon as possible after the early summer flowering is past, cutting out as much of the exhausted wood as can be done without destroying promising growths near the base of those removed. This method not only affords due space for far more valuable wood than the portions removed, but is a great help towards securing the same.

PEGGED-DOWN ROSES.—The pruning of these is conducted much upon the same lines as the climbers. Although extra strong growers are not invariably used for pegging-down, they predominate, and in that case the long shoots of the previous summer are brought to a horizontal position and fastened near the ground; but all plants intended for this purpose should be pruned close to the ground the first spring after planting. That is unless strong plants from pots have been used.

After the first year, cut out most of the shorter growths near the centre of the plants. Then, if more of the long shoots remain than can be affixed to the ground with advantage, thin out those least ripened or matured. Each bud will produce a growth and flowers, so that it is necessary to allow a space of 6 or 8 inches between the pegged-down stems. Varieties bearing bold and upright growths are the best for pegging-down, as roses the flowers of which have a tendency to droop do not show to

the same advantage under this system. As in the case of wall plants, it is advisable to remove the old wood as soon as it has flowered. During an early season, and when many strong new growths from the base have been made, a few of the riper may be pegged down at the end of August, when a second display of bloom may be secured; but, under ordinary conditions, it is wiser to secure one imposing display annually.

Some of the more upright Teas and Noisettes, also any other varieties more perpetual-blooming than the Hybrid Perpetuals generally used for pegging-down, may be grown thus, and will afford a succession of flowers. Care should be taken to secure the new upright growths from the base of the plants, wind-waving and chafing against each other greatly injuring the best and most prominent buds.

For general purposes, the pruning of roses may be divided into three sections, whether we are dealing with Teas, Noisettes, Hybrid Perpetuals, Chinas, Bourbons, or any other of the many classes. The first section is represented by vigorous growers, and, as examples, we may take that well-known old favourite, Gloire de Dijon, from the Tea-scented; Rêve d'Or, from the Noisettes; Madame Gabriel Luizet, from the Hybrid Perpetuals; Madame Isaac Perrière, from the Bourbons; in short, any variety making an annual growth of from 6 to 10 feet.

This section flowers most profusely upon the long growths made during the previous season, and should be pruned as little as possible, only the unripe or frost-bitten points being removed. Our preceding remarks upon summer pruning apply here to a great extent; the removal of growths soon after flowering induces a stronger break from near the base, and the resulting growths, if not unduly crowded, produce the greatest number of the finest blooms during the ensuing season. At the same time, all weak lateral growths, and others that may be misplaced, should be shortened back to the main stems.

The second class of roses may be represented by Général Jacqueminot, Catherine Mermet, and the Old Blush China. Here we must prune on the lines shown in Fig. 86 (next page), the cross-marks showing where to prune, and the dotted lines the resulting growth. Fig. 87 shows what would be the result of pruning the shoots at one height, namely, a bare and almost useless base. Always pay great attention to the thinning out of the centre wood, as light and air are essential to the formation of sound growths. In this class we look for symmetrical plants, which are floriferous and pleasing.

We now come to the last section, and these are the weak and indifferent growers. Comtesse de Nadaillac, Souvenir d'Elise Vardon, Duchess of Bedford, and Horace

Vernet are examples. These frequently make a good shoot or two upon one side of the plant; and we must not look for symmetry here, but leave the strong wood almost intact, cutting back the weaker growths harder. In short, the safest rule is to prune weak shoots closely, and leave most of the sound wood upon strong growths. Mosses and Cabbage or Provence Roses are best if closely pruned.

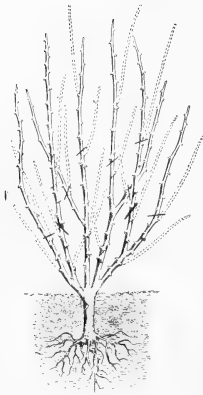


Fig. 86. CORRECT PLANTING AND PRUNING.

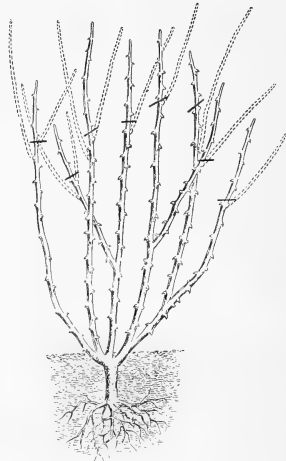


Fig. 87. INCORRECT PRUNING.

(See text, page 175.)

PROTECTING ROSES.

A few years ago the Teas and Noisettes were considered sufficiently tender for many growers to lift them each autumn and store in cold frames until the following spring. The present race of these beautiful roses are equally hardy with others, and little protection is needed for any but a few varieties, such as Larmarque, the white and yellow Banksians, and a few species from warm countries.

With wall and pillar roses it is not an easy matter to protect without overdoing this; but a mat, a piece of old tiffany, or a double screen of fish-netting secured some foot or so from the wall will afford all the shelter that is necessary. The chief aim must be to give just sufficient protection to avoid injury from excessive frost and still admit enough winter weather to secure a thorough resting of the wood.

Over-protection is almost as bad as no protection. Standards can have a little

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WITH COLOURED ILLUSTRATIONS BY MISS HAMILTON AND MISS MARIE LOW.

.....

PROSPECTUS.

SO great has been the increase in the demand for flowers during the past few years, both for home adornment and personal "wear" in towns, as well as the desire for them in the gardens and greenhouses of various sections of the population in suburban and rural districts, that Floriculture has become one of the most popular—as it is one of the most delightful—home pursuits, as well as an important commercial industry.

Evidence of the attractive power of plants and flowers is apparent almost everywhere, and is afforded in many and varied ways—in the crowds, ever increasing, which cluster around the beautiful floral combinations in our public parks and gardens, or that scan the borders for the names of plants and shrubs that are grown there; in the enormous number of flower shows—spring, summer, and autumn—which attract in the aggregate hundreds of thousands of visitors; in the formation of floral societies and their long roll of members; in the establishment of amateurs' and gardeners' associations—those are only some of the outward and visible signs of the deep love for flowers and the strong desire for learning all that can be learned about them that exists among the various classes of the community.

Recognising the force of these facts, and having in view the success of our endeavour to meet the requirements of another section of horticulturists, by the production of "THE FRUIT GROWER'S GUIDE," it is felt that the time has arrived for producing a companion work of the same ornamental and instructive character devoted to the propagation and culture of the several kinds of plants and flowers that are employed for the embellishment of gardens, large and small, furnishing conservatories and greenhouses, and brightening our homes.

In the preparation of "THE FLOWER GROWER'S GUIDE" the services of the same well-known horticulturist who completed the pioneer work indicated so satisfactorily, have been secured; and if a term of thirty years spent in gardens, supplemented by twenty years of editorial experience in connection with two horticultural journals, together with expert coadjutors, qualify for this not light undertaking, then may the work which we have the pleasure to introduce be expected to justify its name.

It is in the full confidence that it will do so that we commend it to all who desire sound knowledge on the subjects on which it will treat. In these days of sharp rivalry we believe "THE FLOWER GROWER'S GUIDE" will be necessary for all who engage in gardening as a vocation, and especially so to the numerous young gardeners who are now commendably striving for the efficiency by which alone they can hope to attain the goal of their worthy ambition. Not less essential must such a work be to the thousands of amateurs who either manage their own gardens or entrust them largely to the necessary, often able, but sometimes peculiar, jobbing gardener or odd man—the very men who themselves are in urgent need of supervision; while all owners even of extensive and cherished gardens will find in them a greater source of pleasure and satisfaction through an acquaintance with the practical routine, even though this may be carried out by the ablest of men.

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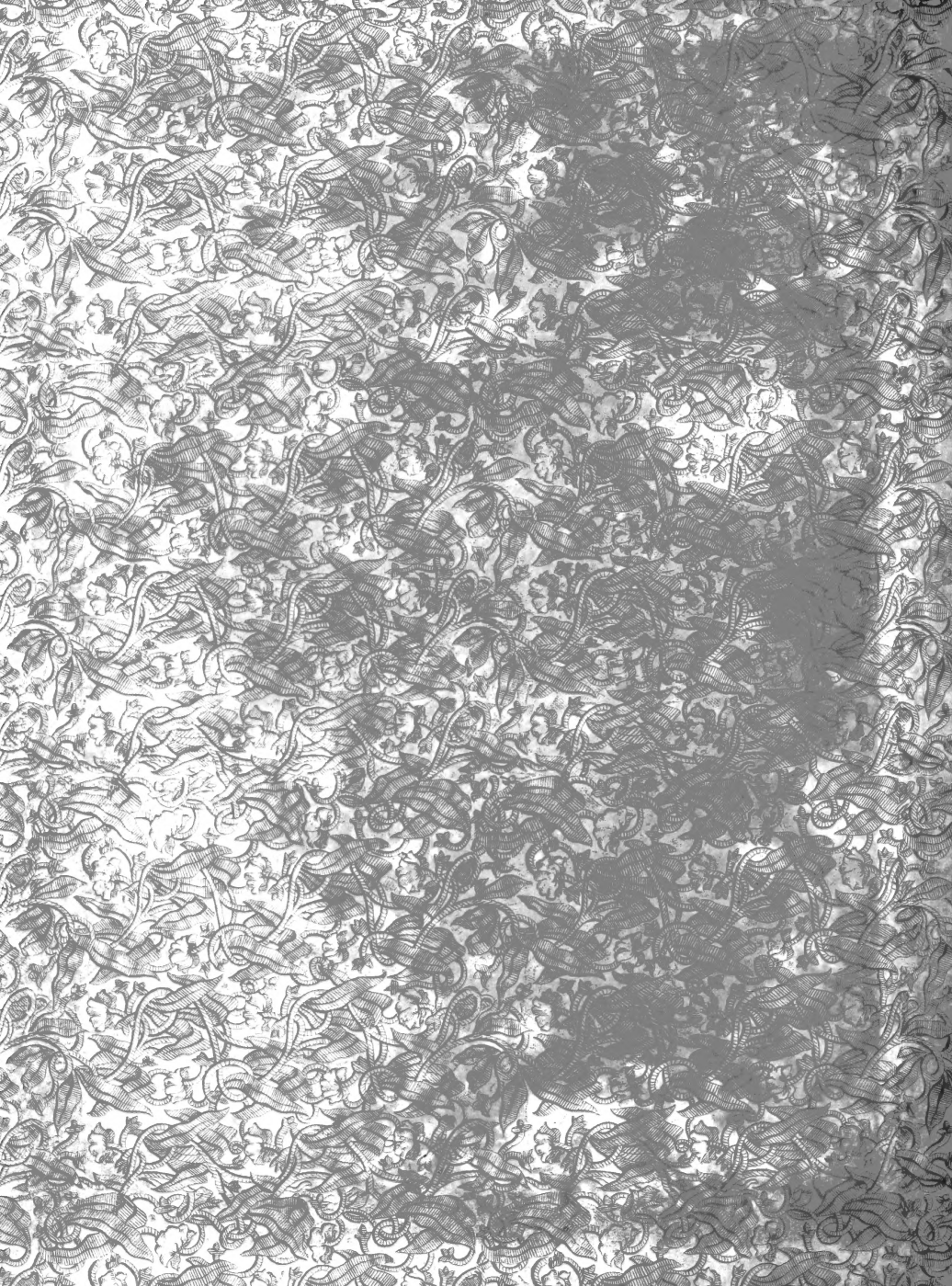
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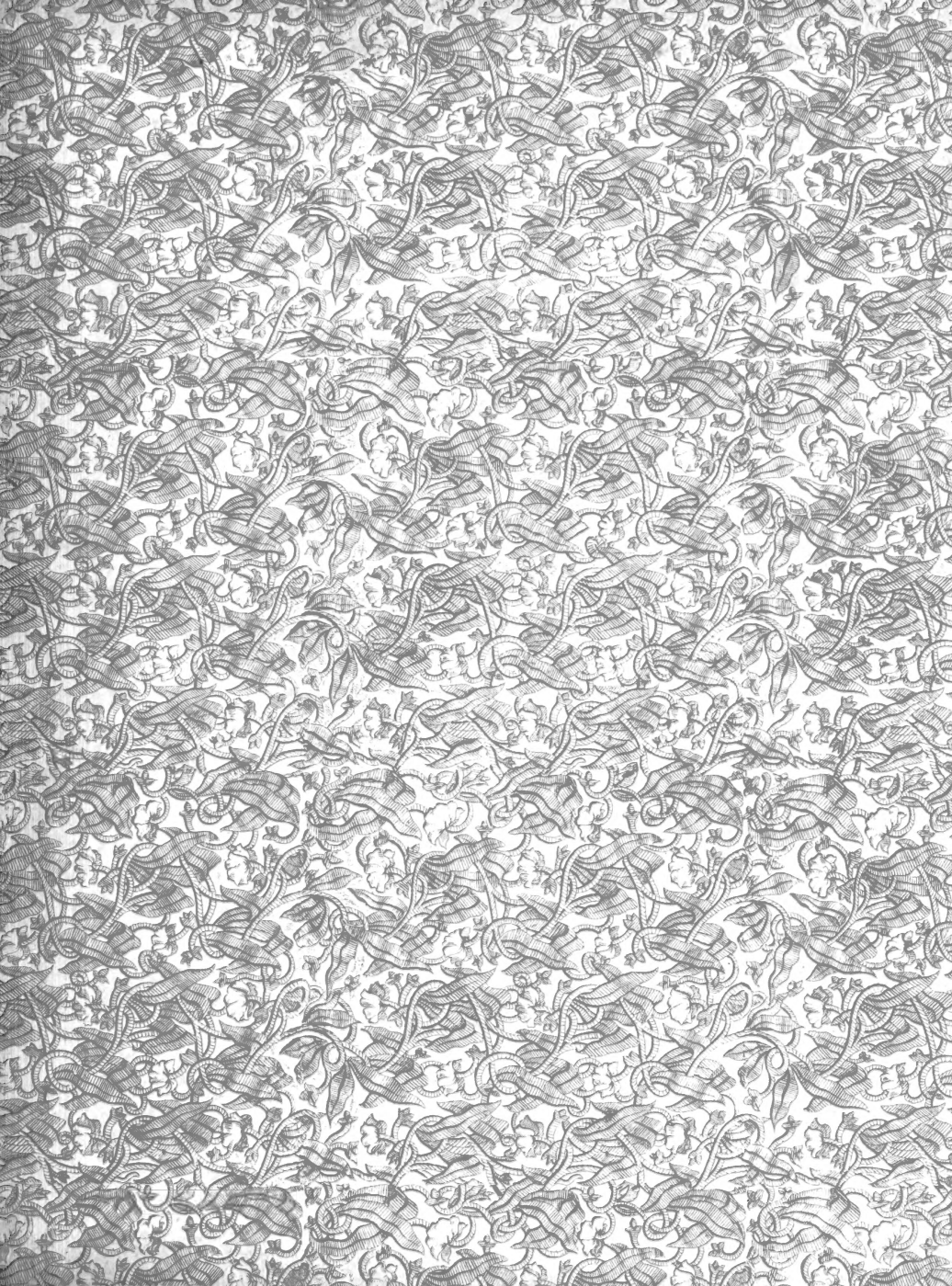
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